UNIVERSITY OF NORDLAND

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MASTER THESIS

How is GHG measured in the Norwegian shipping industry and what are the consequences of publishing it?

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Abstract

With the media-coverage today and world leaders speaking about the need for reduction in greenhouse gas emissions to fight global warming and climate change, it is easy think that companies would publish information regarding this topic. Norway in particular has taken on themselves very ambitious goals to become more environmental friendly and carbon-neutral in the future. Do companies located in Norway follow the same string of thought as their government? The purpose of this research paper is to investigate how greenhouse gases are measured and the consequences of publishing this information. For this paper, the chosen industry was the Norwegian shipping-industry and the companies who are members of the Norwegian Shipowners Association.

To examine this problem closer, published information available in annual reports, sustainability reports and company websites were checked for information. In addition there were four semi-structured interviews as well as information from emails gathered in order to investigate this topic further.

The results show that the measuring of greenhouse gases is very straight forward with only inserting the fuel consumption into an equation that has factors for each resource. The complexity starts with explaining these numbers, and the lack of factors that can represent the emissions in a fair way for every company. Different activities have different emissions, but the emission-numbers do not tell that story. One fear in the industry is that the new EU-directive that is planned to be implemented in 2018 will not be able to give the necessary tools for the industry to report their emissions in a way that is fair for everyone involved.

The results also indicate that there are only positive consequences for publishing greenhouse gas emissions. The companies are able to show their knowledge and skills, which attract other stakeholders for cooperation or business. More surprisingly, the results also indicate that there are no consequences for not publishing this information. There are no stakeholders that are waiting for this information, or raise a red flag when there's a change in emissions. The numbers are reported to the authorities, and that is all that happens.

Acknowledgements

Finally, I believe I made it to the end with my master-thesis in Sustainable Management, and the Bodø-chapter of my life may possibly have come to an end. Who would have known almost three years ago that I would be studying in Bodø. Not me, but life can take unexpected turns with the blink of an eye. I even ended up studying and living one semester in Saint Petersburg, Russia! This journey has been a true rollercoaster, from the very highs to the very lows.

This master-thesis has proven to be the largest challenge in my life so far, and has been very difficult to complete. I've learned much about myself during this year, and hopefully a new chapter will start somewhere else in the near future.

To begin with, I would like to thank Anatoli Bourmistrov for precious feedback and suggestions for this master-thesis. I would also like to thank the informants that accepted to provide information for my master-thesis. For the longest time it seemed that no companies were interested in giving me an interview, and suddenly three companies accepted during two days, and one more the following week. This gave the extra push and motivation in order to write and finish this master-thesis.

I would also like to thank my friends for support. Even if we've been living a long distance away from each other during the last year, you've still been there. To sum it all up, on big thank you to my family as well for being patient with me during the writing of this thesis.

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1. Introduction

The shipping industry in Norway have a long and proud history to look back at, and has for more than 150 years been a significant actor in shipping. In 1875, Norway was the third largest maritime nation with 60.000 sailors and during the First and Second World War the Norwegian shipping-fleet played a big part in the convoys between USA and Great Britain. Despite the low population in Norway, the fleet today is one of the world's largest and most modern fleets (Rederi 2014).

Many things have changed since Norway was the third largest maritime nation in 1875, and one of the hot topics today is climate change. Perhaps one of the more famous attempts to combat climate change was the Kyoto Protocol, which was signed during the UN's UNCED-conference in 1992. The protocol was an agreement to try and stabilize greenhouse gas-emissions on a 1990 level by the year 2000. Despite the agreement, the goals set in 1992 were found to be inferior if they ever wanted to reach the goal to stop the concentrations of greenhouse gases in the atmosphere at a dangerous level (Olerud, K (2015). The increase in for example carbon dioxide emissions have raised dramatically since the beginning of the industrial revolution. Compared to the emissions in 1990, the emissions in 2010 were more than ten million metric tons of CO2 higher (C2ES).

From a global perspective, the average shipping accounted for approximately 2,8% of the global CO2-emissions. This was reduced to 2,2% in 2012 (IMO 2014). The International Chamber of Shipping claims that the emissions can be reduced by 50% in 2050. This can be achieved with bigger ships, more effective engines, and increased consumption of Liquid Natural Gas as fuel and better management of the fleets. The industry's goal by 2020 is to reduce ships' CO2 by 20%, and will in 2015 be achieved ahead of schedule (ICS). Despite being responsible for 2,2% of the total emissions of CO2, transport by ship stands for about 90% of world trade. The transportation sector consumes approximately half of the world's petroleum supply, and marine shipping uses about 11 % of that part. In comparison, the rail-industry only consumes 4 % of that share. Despite this, shipping offers lower carbon intensity than other freight modes (ICCT 2013).

In 2007, the prime minister in Norway, Jens Stoltenberg, suggested that Norway should set a goal to become carbon-neutral by the year 2050. In the process to achieve this goal; Norway should have reduced their emissions by 9% in 2012, compared to emissions in 1990. In addition, the next goal was to reduce emissions by 30% in 2020, compared to the levels in 2012 (Aas, K,S (2007) **7**). In 2012, Norwegian politicians accepted to reduce their emissions after looking working with *Meld.St.21 (2011-2012) Norsk Klimapolitikk.* This was also based on the previous work with *St.Meld. Nr.24 (2006-2007) Norsk Klimapolitikk.* The goals were to:

- over perform in the agreement with the Kyoto-protocol by 10% in the first period

- Cut emissions by 30%, compared to the levels in Norway in 1990

- Carbon-neutral by the year 2050

- Norway shall reduce the global emissions with the amount Norway's is responsible for, by the year 2030.

In 2015, with Prime Minister Erna Solberg, the goals were raised further. In the Kyoto 2-agreement, Norway has a goal to reduce emissions by 30% compared to the levels in 1990. Norway should have more ambitious goals, and have a new goal of reducing emissions by 40% instead of 30% (Regjeringen 2015).

So far, there is little improvement in greenhouse gas emission from Norway, and the goal in 2020 will be difficult to reach. In 1990 there was 52 million ton of CO2 equivalents released from Norwegian territory, and in 2014 the number was 53,8 million tons from Norwegian territory (SSB 2015). This is an increase of emissions by 3,5%, compared to the levels in 1990. The majority of emissions from Norwegian territory comes from the oil- and gas-sector in Norway, which is responsible for 14,7 million ton of CO2 equivalents. Air- and sea-operations are combined responsible for 6,3 million ton of CO2 equivalents. Some countries are able to meet their emission reduction targets, but it is only by purchasing emission reductions from developing countries through the Kyoto's Clean Development Mechanism (McNicholas et.al 2011). Instead of reducing their own emissions, countries and companies pay other countries to pollute less so that they can remain, or increase, their current level of emissions.

The goal to reduce emissions is based on stopping global warming at 2 degrees Celsius, but recent projections suggest that we are going past that level. On October 1st 2015, an analysis released by Climate Action Tracker suggested that with the current actions taken, global warming will be 2,7 degrees Celsius (Climate Action Tracker 2015). This projection is the first since 2009 that have a projected warming below 3 degrees Celsius. The main causes and impacts of climate change can be directly linked to economic and social activities. One of the six major sustainability problems are climate change, and the other five are deforestation, scarcity of drinking water, loss of biodiversity, population growth and poverty (Stern, N., 2007).

Problem statement

During the spring semester in 2014, I worked with a group project involving carbon emissions from the Norwegian shipping industry. We discovered big differences among the companies about how they report their environmental impact, level of detail or if there were any reports to find at all. There are many sources of greenhouse gas emissions from Norway, but the main focus here is on how the Norwegian shipping industry are working and reporting on this matter. The Norwegian government has taken ambitious goals concerning this area, and it is therefore interesting to take a closer look at how one of the nation's biggest industries is dealing with this matter.

Reporting on environmental issues is often referred to as Sustainability Accounting, and often businesses claims that they are sustainable. One of the issues is that there is not an absolute definition on what sustainability actually is. *''Sustainability accounting'' has become a generic term. Review of the literature reveals a blurred picture of what is covered by this and related terms, such as ''sustainability management accounting and ''sustainability financial accounting''.''*(Burrit et.al 2010). Therefore, the views on environmental accounting can differ from company to company.

The research aims to find out how the Norwegian shipping industry measures their greenhouse gas emissions, and the consequences of publishing it. The problem statement is:

How is GHG measured in the Norwegian shipping industry and what are the consequences of publishing it?

2. Theoretical Framework

This chapter will present the theoretical framework of the research. The literature used in this study is found through random search with the problem statement in mind. Greenhouse gas-accounting and reporting are important subjects in sustainability, sustainable development and triple bottom line, and this chapter will go in further detail about what this means. There is no definite term, or standard definition, regarding sustainability, sustainable development and triple bottom line. Different companies, authors and researchers have different definitions when they speak about these subjects.

This chapter will also describe greenhouse gas accounting, what it is and different ways to measure it. There are different methods and standards applied within this area, and this chapter will take a closer look on these matters. The chapter will also discuss accounting in general, in different contexts and what it is.

Sustainability:

The measurement and publication of greenhouse gas emissions can be said to be a part of sustainability and sustainable development. There are many definitions of sustainable development, but perhaps the most famous one is from the World Commission on Environment and Development's report called Our Common Future, also known as The Brundtland Commission. Here sustainable development is defined as: *"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs"*(Brundtland et.al 1987).

Already here there are some problems with the definitions, since it is unclear what exactly needs imply. Different people have different needs, and the answers will differ greatly if you ask rich or poor people, or people from different parts of the world. Almost a quarter of a century since the Brundtland Report, we can still argue that sustainability is insufficiently understood. By that inference, the potential contribution of corporate sustainability accounting should be abandoned or truncated, since it is not possible to define what it actually is (Burrit et.al 2010)

An also well-known view on this matter comes from Milton Friedman, where he explains his view in an article published in 1970 in Times magazine. He argued that the sole purpose of businesses is to generate profit for shareholders. Companies that adopted "responsible"

behavior would render them less competitive, compared to companies that did not, rendering them less competitive (Friedman, M 1970). This view has been challenged since the 70's by others, and today more enlightened companies realize that social responsible activity makes good sense in business, and that engaging with the company's stakeholder can be used to improve the economic performance of the company (Burrit et.al 2010). The reporting to stakeholders can be done through many different communication channels, and vary among the different stakeholders based on their needs and the nature of the information. The content of the reports may vary considerably, and the company should therefore classify corporate stakeholder and their needs within a framework for reporting purposes (Birkin et.al 1997). When an organization is made accountable for the costs of how their actions affect the environment, the organization should be driven to minimize the adverse effects of their activity (Horngren et.al 2011)

It has been suggested that only one in ten financial institutions have taken steps to measure their portfolio-level exposure to risks posed by climate change and its attendant regulatory environment (Haigh et.al 2011). KPMG found out in 2007 that around 85% of the 500 largest listed Australian companies do report on related issues of greenhouse gas emissions and climate change. It is suggested that the reason is the organizations that possess legitimacy are viewed as trustworthy, and therefore are more likely to be able to secure resources necessary for survival (Hrasky 2011).

There are two different variants of sustainable development, which can be labeled as weak and strong sustainability. Weak sustainability is if the total stock of capital resources, including ecological capital, which generate income is being depleted over time. Strong sustainability is when future generations can be endowed with the same amount of natural resources that the present generation has access to (Herath 2005).

In order to achieve sustainable practices and eco-efficiency, organizations are seeking to innovate new products that perform better and also improve their existing processes to reduce the consumption of resources and the environmental damage caused by their activities (Ferreira et.al 2010). In order for businesses to survive, most organizations have to innovate constantly. Innovation is the conversion of new knowledge into a new product, process or service and the assembly of the new product, process or service into actual use (Johnson et.al 2011)

Greenhouse gas accounting:

Before the 1980's, environmental accounting was not articulated as a distinct research object. However, it was during this decade that pressure started to arise for companies to disclose environmental liabilities, which led to studies that focused on explaining environmental disclosures in terms of corporate characteristics. The most influential publication during this time period was the *Bruntland Report* in 1987, which created the impetus for an identifiable area of research in this area (Bebbington et.al 2014).

One broad definition of carbon accounting is the measuring of emissions and removals on the one hand, and the implications for finances on the other hand. This means that nonmonetary and monetary aspects from an organizational perspective are included (Guenther et.al 2011). One problem that is stated is the missing international carbon and reporting standards, which makes it very difficult to compare data sets to each other (Guenther et.al 2011). One analysis suggests that the social responsibility and environmental reports are prepared, but who prepares them and whether the reports are subjected for audits remain unclear. Annual reports rarely contained non-financial quantitative data, and sustainability reports did not follow a specific standard of format. GRI and other similar guidelines appeared to be inadequately complied with (Negash 2012).

According to Sathiendrakumar (2003), carbon dioxide emissions depend on four factors, which are:

(1) Population size

(2) Gross domestic product (GDP) per capita

(3) Energy efficiency – Energy utilized per unit of GDP

(4) Carbon dioxide generated per unit of energy utilized

This means that the total emissions of carbon dioxide can be represented in the following equation:

Total emissions = (Population) (GDP/Population) (Energy/GDP) (Carbon dioxide/Energy)

If we wish to maintain high GDP per capital, and the same quality of life, it is necessary to reduce population size, energy requirement for production and/or emission of carbon dioxide per unit of energy utilized.

Standards and certifications

Think-tanks like World Resources Institute (WRI), World Business Council for Sustainable Development (WBSCD) and International Organisation for Standardisation (ISO) have made tools and rules for measuring and reporting carbon emissions. Their greenhouse gas protocol and ISO 14064 is becoming the de facto standards of corporate carbon footprint reporting (Andersson et.al 2014). In addition there are other standards such as Global Reporting Initiative (GRI), Accountability: Institute of Social and Ethical Accountability (AA1000) and Sustainability Integrated Guidelines for Management Project (SIGMA).

These different standards are designed to meet the needs of different stakeholders groups, which are driven predominantly by their governance structure. There are some that argue that the guidelines given by WBSCD, AA1000 and SIGMA are business oriented standards, which imply that they are made by businesses for businesses. In comparison with ISO and GRI, these two do not appear to represent sustainability reporting for businesses solely for their own benefit (Adams et.al 2007). A comparison of five major cement manufacturers GRI-reporting was made, and the results showed that it was difficult to compare sustainable performance against each other. There was a lack of comparison against the industry benchmark, which made it difficult to see how companies compare with another one (Isaksson et.al 2009). A similar study in Denmark showed that the annual reports from six Danish companies were very dissimilar when it comes to topics and dimensions and discourses expressed in terms of perspectives, contextual information, stakeholder priorities and ambition level. The companies used different strategies when it comes to reporting CSR, and the focus on the different topics were different among them (Nielsen et.al 2007). This shows that even reporting under the same set of guidelines, there can still be problems comparing the performance of different companies.

Stakeholders

The purpose of the reports is communicating with the organization's stakeholders; the number of demands from each stakeholder will vary. It is not possible to please everyone within the reports, and the managers need to determine which social, environmental and economic needs and expectations they will try to address in their CSR and social and environmental reporting. It is important that the organizations will prioritize the needs and expectations of stakeholders upon whose lives the organization's actions have the greatest negative impact on. The risk's involved by using this method is that it is possible to ignore stakeholders that have a substantial negative impact from the organization's activities. It is also assumed that the negative impacts from the organization's activities on stakeholders can be assessed with a reasonable degree of certainty. This also implies that the organization is able to objectively rank how their actions affect their stakeholders, but since this is partly based on subjective perceptions, the outcomes can differ (Unerman 2007).

The stakeholders can put pressure on organizations to act according to their expectations, and there have been some research on how stakeholders can push organizations to publish their greenhouse gas emissions. A sample of 431 EU companies was studied over the period from 2005-2009, and it was found that a substantial proportion of the firms published some quantitative information about their greenhouse gas emissions. The research also indicated that most of the companies, 85%, had incomplete disclosure. A possible explanation for this was that the reporting is a voluntary activity, and could be seen as a symbolic gesture from the companies (Figge et.al 2015). This is also supported by a research done on how the financial crisis in 2007 affected CSR and sustainability reporting during 2005-2010. The results were that the number of CSR reports increased after the financial crisis, which increased the trend of CSR reporting among companies. It therefore seems that companies perceive CSR reporting as a valuable investment in spite of its costs (Benau et.al 2013). However, studies also imply that size does matter when it comes to sustainability reporting. Larger companies are more visible than smaller competitors, and are therefore perceived to have higher responsibility. Businesses that are operating in industries that are seen as environmentally sensitive tend to have better reporting practices. A reason for this is that they may have a higher amount of concerned and well-informed stakeholders who put pressure on the company/industry (Amran et.al 2014)

Organizations are dependent to maintain their operations, but is has to be done within the extent they have support from the community. The support from the community can be earned by being perceived by the society as complying with the expectations with which they interact. These expectations between the society and the organization can be called "the social contract". This contract is not physical, it is only a theoretical contract that no one can go and find a copy of. If a company deviates from this contract, a legitimacy gap occurs, which means there is a lack of correspondence between the society's expectations and how it is perceived that the company acted. It is also possible for the company to lose legitimacy, even if it is following all the expectations from society, but have failed to make disclosures that show it is complying (Deegan 2007).

The overall reduction of greenhouse gas emissions is not something a country or company can achieve on its own, it needs a global commitment. The causes and consequences of climate change are widespread, and they stretch beyond the boundaries of nations and companies. One problem is that the atmosphere can be considered a "public good", and is thus subject to free-riding from other nations and companies (Boston et.al 2011). This means that when other participants reduce their emissions, everyone benefits from it. The reduction of emissions in Norway does not only impact the atmosphere above Norway, but on a global level.

Organizations often discover that they are un-sustainable, but they can be claiming in their reports the opposite. Suggestions for new accounts can be accused of impracticality unless opportunities exist to apply them to the organizations. From experience, this shows that organizations to not want an account that threatens their credibility (Gray 2010). Companies can have an interest to use reporting to facilitate the construction of a different image of the company, and may even try to reduce that is known about a company and its environmental activities (Hopwood 2009).

There are in particular three carbon accounts that are being widely applied: Territory account, production account and consumption account. Territory account can be described as emissions that take place within national territories and offshore areas where a country has jurisdiction. Emissions caused by international shipping and aviation are not included to individual countries, so they are included in territory account. Production and consumption account are calculated using input-output method based on final consumption. The difference here is that production is defined as "*emissions caused by production of goods/services that*

are produced domestically and consumed domestically plus emissions caused by productions of goods/services that are for export", while consumption is defined as "*emissions caused by production of goods/services that are produced domestically and consumed domestically plus emissions from imported goods/services occurred in abroad*" (Dong et.al 2014).

There is also evidence that suggest that carbon emissions are reflected in the cost of capital. The anticipation is that investors and equity owners will have to estimate the risks of future negative cash flows as a result of carbon emissions, like for example carbon tax, payment of carbon permits and emission penalties (Li et.al 2014)

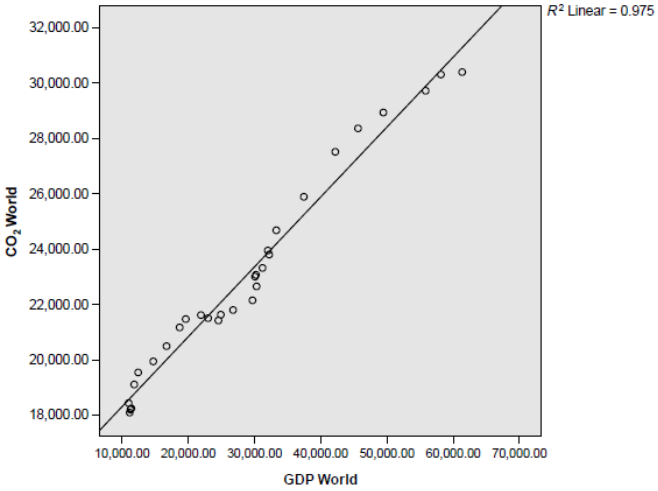
Accounting and economy:

Financial accounting is providing the foundation of information gathered within organizations, and is prepared to external stakeholders through disclosure in external reports. Statements such as financial performance, balance sheets etc. shows the financial situation of the organization at a particular date. A second type of accounting is called cost accounting, which provides information about inventory asset values, which is included in the annual financial reports. These developments in accounting show that sustainability accounting can be developed in different ways. The first option is to base it on a completely new system, where accounting is designed to promote a strategy of sustainability. The second option is to extend, or modify, conventional financial, cost or management accounting (Burrit & Schaltegger 2010). One of the problems with traditional finance and accounting is that there is little research that has been specifically focused on flora, fauna, habitats or biodiversity. A issue with accounting for biodiversity data is to decide what data to record and how to records them (Jones et.al 2013)

One of the conceptual developments of sustainability accounting has identified three different methods of sustainability accounting: Sustainable cost, natural capital inventory accounting and input-output analysis (Gray 1993). Sustainable cost can be described as the hypothetical cost to restore the earth to the state it was in before the organization's impact, which is *"...the amount of money an organization would have to spend at an end of an accounting period in order to place the biosphere back into the position it was at the start of the accounting period"* (Gray 1994, p.33). One practical problem is if there is any critical damage that could

for example cause extinction of species. The value would in theory be infinite, since the cost is irreplaceable. Natural capital inventory records the stock of natural capital over time, and use the changes in stock levels as an indicator of the quality of the natural environment. The various types of natural capital stocks can be distinguished into different categories, where some are more critical compared to the others (Lamberton 2005). The input-output analysis aims to measure all the material input of the process, and the output of finished goods, emissions, waste for disposal and the recycled materials (Jorgensen 1993).

The global emissions of greenhouse gases can be directly linked to the growth of the economy. The figure on the right compared the total emissions from 1980-2008 against the global economic output in million tons and billions (Lane 2011). In order to reduce the global emissions, there will be a cost for the present generation to pay.



Source: CO_2 emissions + Population: EIA (2010); GDP data: The World Bank (2011)

These costs include the possibility of lower GDP growth rates, negative impact on social and employment because of the changes in structure of the economy and production processes, as well as increased prices for energy and transport (Boston et.al 2011). The economic tools available to reduce the greenhouse gas emissions are carbon tax and tradable permits. Carbon tax gives organizations the option with either improve their efficiency so that the emissions are reduced, or pay a tax for the damage caused by their pollution. Tradeable permits gives the countries/organizations the right to trade quantity of emissions under a system where the total quantity of allowable carbon dioxide emission is fixed (Sathiendrakumar 2003). There are some worrisome features when it comes to tradeable permits, and purchasing these permits depends a lot on the credibility of such schemes. Purchasing permits do not necessarily result in a reduction of emissions, and to avoid this problem the buyers should demand to see that the offsets meets certain criteria (Yeoh 2008).

For an accounting system to be fully functioning, the system needs to be based on measurement techniques that are materially accurate. This implies that they need to reflect the actual atmospheric emissions, consistent over space and time through using equipment that is calibrated, agreed procedures and verification, and incorporate indicators of certainty to allow for valid interpretation of data (Bowen et.al 2011). One of the challenges with the reports today is that without using a defined reporting standard and/or independent assurance, the credibility of a company's report is vulnerable to criticism. Some companies may wish to demonstrate that their environmental footprint is smaller compared to their competitors, while others want to show that they are improving their performance and making progress toward a lower environmental impact from business activities. Positive progress can be presented in the reports, but negative or failed impacts can often be left out of the reports (Olson 2010).

Carbon can mean several different things on its own, and is by scientists a reference to elemental carbon, or more popularly to refer to principal greenhouse gas, carbon dioxide or as shorthand for all greenhouse gases. There are five major framing of carbon accounting, which involves actors as scientists, politicians, economists, accountants and activists (Ascui et.al 2011).

The measurement of greenhouse gases can be used in two units. It can be measure in CO2 equivalents, which is measuring the emissions in tons, or it can be measured in units of area such as global hectares, which shows global warming impact potential and area-based units of land appropriation (Mozner 2012). There are different international standards with a focus on different kinds of corporate carbon accounting. Examples of such standards are the British Standard PAS 2050 for carbon labelling, ISO 14067 for carbon foot-printing of products or ISO 14064 for greenhouse gas reporting (Csutora et.al 2012). Another standard that is closely related to ISO is EMAS, which highly matches ISO 14001. The preference between these two depends on cost of implementation and the registration when compared to perceived reporting benefits and the consistency of the existing management of the firm. Standards such as EMAS and ISO 14001 do not define the possible results, but only prescribe details of enabling elements. The results are up to the participating organizations to define, set as a target and achieved (Bracci et.al 2013). This means that the organization can report according to the standard, but it does necessarily mean that the company is sustainable.

3. Methodology

The purpose of this study is to get an understanding about how the Norwegian shipping industry approach and measure greenhouse gas emissions, and what consequences these reports have for the companies. This chapter will go in details about the study's research design, discussion about how to maintain quality in the study, and also the progress of collecting data.

Research design:

To take a scientific standpoint can be related to development of knowledge and content within the knowledge (Saunders, Lewis & Thornhill 2012). The researcher may not be aware of how their approach to the subject is being affected by the paradigm their academic discipline is built upon. It is therefore important that the researcher have reflected over how his or her scientific may affect the research. My background is from studying accounting in the bachelor's degree, and sustainable management in master's degree. It might therefore be easy to be more critical towards environmental issues compared to other backgrounds.

In order to answer a problem statement, there are three possible types of research design: qualitative, quantitative and mixed research. Choosing one of these options gives an indication about what methodology the researcher prefer (Saunders et al., 2012). Another important aspect is if the problem statement is to be answered in numbers or text. Quantitative research is mostly expressed in numbers, while qualitative research is expressed in text. A mixed research is a research method that draws from both positivist and constructionist epistemologies (Easterby-Smith et al., 2012). While greenhouse gas emissions can be expressed in numbers, it does not explain the reason behind these numbers. This makes a qualitative approach more flexible compared to a quantitative approach, since the structure can for example vary in in-depth interviews (Johannesen et.al 2009). Therefore, a qualitative research design was appropriate for this research since the goal is to get a deeper understanding of how greenhouse gas emissions are measured, and the consequences the companies get for reporting/not reporting them.

Case study:

One definition of case study is "*..the case study looks in depth at one, or a small number of, organizations, events or individuals over time"* (Easterby-Smith et al., 2012). This definition implies that it is necessary to declare what the case study is about. This study looks in depth at a number of publications from different organizations, which in this case were the members of Norwegian Shipowners' Association by the time of January 1st 2014.

The problem statement is written as a how- and what question, which makes case study a relevant research strategy (Yin, 2014). A case study should also be considered when you; (a) cannot manipulate the behavior of the people involved in the study; (b) when the researcher want to cover contextual conditions because the researcher believe that they are relevant to the phenomenon under study; (c) the boundaries between the phenomenon and context are not clear (Yin, 2003).

This research is involving several different companies within the same industry, and can therefore be viewed as Multiple-case study. A multiple-case study gives the researcher the possibility to explore differences within and between cases. There will be drawn comparisons between the cases, and it is imperative that cases are chosen carefully so that the researcher is able to predict similar results across cases, or predict contrasting results based on a theory (Yin, 2003). A big part of this research has come from reading and analyzing reports published by the companies in the Norwegian Shipowners' Association, which is also known as content analysis (Thagaard, 2009).

Data collection:

In order to analyze how the Norwegian shipping industry handle and measure greenhouse gas emissions, the companies who were members in the Norwegian Shipowner's Association were chosen for further analysis. At January 1st 2014, there were in total 152 members of the Norwegian Shipowner's Association, and then the progress of looking at each companies published reports began. The timeframe chosen was from 2011-2014, and the main focus was put on information published in their annual reports or sustainability reports. In addition to publishing information in annual and sustainability reports, several companies also have information on their company website. Therefore, the websites of each company were also checked in order to find information that was relevant to the research question. The websites were checked for information during the spring of 2015, from February to March.

Reading and analyzing these reports is called secondary data, and are often easily available in business research and can include information related to a specific company. The secondary data is often used as a complement to primary data sources, such as for example interviews, but has already been collected with a different goal and agenda (Easterby-Smith et al. 2012). Primary data are collected for the specific research question, and are using procedures that fir the research problem best. Every time primary data are collected, new data is added to the existing store of social knowledge (Boeije & Hox 2005)

Data collection is a disputed term within qualitative research, and can give the wrong associations to the research process. Data is only created when the researcher decides that it is data, through analysis (Patton 2002). Some claim that data will always be social constructed, and would rather describe the term data collection as data construction (Andersen 2013).

Selection of candidates for interview:

After looking at the publications from the different companies, it was clear that there were big differences among the companies about how and what they have chosen to publish. The companies were divided into six different categories, which are further described in chapter 4 in this research paper. For the purpose of interviews this was narrowed down to three different groups:

Group 1: Companies that publish information about greenhouse gas emissions.

Group 2: Companies that publish some QSHE related information

Group 3: Companies that do not publish any information

By strategically choosing companies to interview, it will be easier to secure that the companies that can provide the best relevant information (Beck et.al 2010). This method ensures that companies from the different groups get to provide information, and not only provide information from companies that are placed in the same group. One of the problems choosing this methods is that there is not an even spread of the companies in the different groups. The total pool of companies involves 152, but not everyone is suited for an interview this research aim to do. Companies who specialize in management, catering, investments etc. were excluded from the possible companies to interview.

It proved to be a difficult task in order to arrange interviews with different companies. Emails were sent out to a large number of the members in Norwegian Shipowners Association, but very few of them replied. There can be several reasons behind this, and one possible explanation is the current economic situation in Norway were many oil and gas companies have reduced their activity because of a decrease in the price of oil. This has resulted in lower activity for other industries that is working closely with the oil and gas industry. Another probable explanation was discovered during the interviews, which was that certain segments within the shipping industry do not have a focus on the topic of greenhouse gas emissions. The main reason is that they have no control over the ships during operation; it is the customer that chooses how to operate it. Therefore, the emissions are for the most part decided by how the customer wants to operate their vessels.

The smallest group, with good margin, are the companies who are located in group 1 with only 13 members. Group 2 and 3 are of similar size, roughly 60 companies in each category, but these companies may be more resistant to accept an interview since they are not reporting greenhouse gas emissions. It is easier for the companies in group 1 to explain why they report their emissions, rather than group 2 and 3 that has to explain why they do not report their emissions.

The companies were contacted by email where I gave a short explanation of my research question, and that I wished to perform an unstructured interview. The topics/questions were presented in the first email to every company that was contacted. Each company was asked if they wanted to be anonymous in the research paper, but could also choose to reveal their identity if they chose so. The email also stated that I wished to record the interview on tape, but that it will be deleted after the research paper was sent for grading. Since the companies are divided into three different groups for interviews, and six different categories in empirical findings, it is possible to keep the candidates anonymous. The smallest group here is group 1, which only contained 13 members. The level of anonymity for this group is therefore lower compared to the other groups. The anonymity for companies in group 2 and 3 was much higher since both groups consist of roughly 60 companies each.

It is important for the researcher to be aware of the responsibility he or she has over the collected data. Due to ethical responsibility it is important to not publish or circulate information that has a chance of harming the interests of individual informants. In order to assure this, some key principles in research design were followed. There are in total 10 key

principles, and the first seven of these principles are guidelines about protecting the interests of the research subjects of informants. The purpose of the last three is to ensure accuracy, and lack of bias, in research results (Easterby-Smith et.al 2012).

Key principles in research ethics
1. Ensuring that no harm comes to participants
2. Respecting the dignity of research participants
3. Ensuring a fully informed consent of research participants
4. Protecting the privacy of research subjects
5. Ensuring the confidentiality of research data
6. Protecting the anonymity of individuals or organizations
7. Avoiding deception about the nature of aims of the research
8. Declaration of affiliations, funding sources and conflicts of interest
9. Honesty and transparency in communicating about the research
10. Avoidance of any misleading or false reporting of research findings

Table 1: Key principles in research design (Easterby-Smith et.al 2012, pp.95)

Interview:

For this research, a semi-structured interview was chosen. This means that the themes for the interview will be defined, but the questions can and may vary during each interview (Thaagard 2009). This method was chosen for several reasons, and one of them is that the companies have different ways of reporting information. Questions that seem fit for companies in group 1 may be inappropriate for the companies in group 2 and 3, and vice versa. Another reason is that this method allow the interviewer to follow up on interesting/unexpected answers that the respondents. Since I have no experience in greenhouse gas accounting, or the shipping industry, there can be several different factors that I have not thought of before the interview.

Another problem with having no experience from the industry or accounting is that the researcher may be interpreted negative by the respondent during the interview. Since there is direct contact between the researcher and respondent, the presentation of the researcher may influence the interview-process. This can be how the researcher behaves and is dressed, comments and statements during the interview, presentation of documentation and which

questions were chosen (Saunders et.al 2012). From someone outside of the industry, there can also be several expressions or shortenings of words that outsiders may not be aware of. It is therefore important that these are explained during the interview-process so that the researcher do not interpret statements wrong (Yin 2011). Another issue with not knowing the industry is that the questions asked can be considered as irrelevant for the company, and not focusing on what the industry/company feels should be the main topics for further research. This occurred during one of the interviews with a company, where it quickly became clear that the questions regarding publishing and reporting greenhouse gases were not suited for their segment in the industry. The same thing was mentioned by other interviewee's that these kinds of reports were very dependent on what sort of segment their business was related to.

For practical and economic reasons, the main approach to do the interviews was by Skype or telephone. The majority of the industry is not located north in Norway, where I lived during the research, which made face-to-face interviews difficult to achieve without spending a lot of money on plane tickets. Doing an interview by phone can prove successful if they have already established connections with the respondents before, and already have established a good relationship of trust. However, if they have never met interviewee before, it is advised to avoid telephone interviews until a good relationship has been established (Easterby-Smith et.al 2012). Another problem by doing the interview over telephone is that you cannot see the interviewee, and therefore it is not possible to observe their body language and/or other gestures using for example their hands. Your only source of information is what they say, and the tone of their voice.

The information from the interviews was recorded, and after the interviews were over it was transcribed. This makes it easier to find relevant information from the interview, and you are able to make sure that the information you use are correct. By placing the answers in different categories it makes it easier to interpret the information, and also compare what the different informants had to say about each topic.

In total, there were four interviews done over telephone with different companies in the industry. Unfortunately no companies in group 3 responded or were willing to accept an interview, so the interviews were with companies that publish their greenhouse gas emissions and companies that publish QSHE-information. In addition to the interviews, information provided by two other companies from emails was also used in this research paper. In order to

keep the informants anonymous they will only referred to as Informant 1-6 in this research paper.

Translation of interviews:

All the interviews were done in Norwegian, and the questions were also presented for the different companies in Norwegian. All the direct quotations in this research paper are therefore translated to English by the researcher. There is always a risk of losing information when translating from one language to another. Certain expressions may not have a decent counterpart in the other language, and the translator has to present the informants' data using a combination of their own translation and what the informant said. One example that happened during one of the interviews was the Norwegian expression "voldsomt problem", which directly translated to English means a violent problem. The informant did not mean that they had issues with violence in their industry, but rather that the problem was of significant magnitude. Direct quotations can also be a double-edged sword, since you are not able to describe the way it was said. Certain parts of the interview can contain ironic statements by both the interviewer and interviewee, but it will not show just by reading a transcript of the conversation. It is therefore critical that the researcher is able to understand this, and not interpret these elements literally.

Quality:

When it comes to ensure the quality in research, the words reliability and validity are often mentioned. Validity is the extent to which measured and research findings give a precise representation of the subject that the researcher is actually supposed to be describing, while reliability is the consistency of the measurements done by the researcher (Easterby-Smith et.al 2012). In other words, validity describes to what degree you can draw valid conclusions from what you have researched, and reliability describes if your findings are consistent. If you for example measure something several times and the results are the same, your results have a good reliability.

The companies involved in this study can update their websites from day to day, if they wish to do so. Therefore, the findings on some of these companies' websites can be said to have low reliability. What is discussed in this paper can easily be irrelevant after a day, week or month if a company updates what is published on their websites. The published annual reports and sustainability reports cannot be edited after their publication. What is written in them for

the given year will always be the same in the future. Therefore, the information gathered from such reports can be said to have good reliability.

It is not likely that the findings in this research is able to answer for certain how the members of the Norwegian Shipowners Association handle and feel the consequences of greenhouse gas reporting and publications. However, it will still provide some insight in what the topic greenhouse gas is for the industry. In order to try and get the best possible picture of the data collected, different views were gathered from different sources. Any research should be able to be tested after publications, which means that other researchers can attempt to see if their results provide the same answer (Halvorsen 2009). Therefore, the research design should be described as accurately as possible.

4. Empiric findings

In order to find companies to investigate further, companies that were members of the Norwegian Shipowners Association was chosen for the research paper. The list of members had not been updated for 2015 at the time this the companies was chosen, so the companies which were members on January 1st 2014 makes the pool of companies. In 2014 the Norwegian Shipowners Association had 152 members (Rederi.no), but not all of these companies can be seen as relevant when it comes to carbon accounting. Many of these companies are not directly responsible for any emissions, and it would therefore make little sense for them to have any carbon-reports at all. One example of such company could be AS Selvaag Invest, which is a company involved in investments, not actual shipping.

The basis of this research was to look at reports published from 2011-2014. The members of Norwegian Shipowners Association have a great variety in how much information they publish about their performance in general. Some companies publish almost purely financial information in their annual reports, while others publish some QHSE-information or even have their own sustainability reports. Wilhelm Wilhelmsen has for example published stand-alone sustainability reports which include carbon emissions, while most other companies do not. In general, it was very difficult to find any useful information published on the websites owned by the different companies. Some companies have made a great effort to make their website easy to use, with good information, while other companies have not made a big effort to keep their webpage up to a standard that you would expect in 2015.

Almost every company in this list, who published some information, has one big thing in common. The reports published are very similar to each other, and they all follow a certain recipe for every year. For example, the 2011-report from Farstad Shipping is very similar to the report in 2012 and 2013. It would probably make little sense that reports drastically changes from one year to another, but it was surprising to see how similar they were. Other than new financial numbers, the rest of the information seemed to be more or less the same from last year.

Looking at the information made available by the companies, the companies were divided in 6 different categories. For a list of the companies listed in each category, see Appendix.

- Category 1: 14 companies publish emissions
- Category 2: Circa 30 Have not published emissions in their reports or on webpage, but have a decent amount of QHSE-information available
- Category 3: Circa 30 companies have not published reports, have some basic QHSE-info on their webpage
- Category 4: Circa 45 companies have not published any information
- Category 5: Circa 20 companies that are members of Norwegian Shipowners Association, but or involved in other activities than shipping (Catering, investment).
- Category 6: 12 companies without webpages or any information available

It is difficult to draw the line where information is related to QSHE or not. What some might consider being barely within QSHE, others may not share the same opinion. This means that this list can have some variations, depending on the person making the list. Therefore the companies are listed here as approximates, and not definite numbers. What one person considers a category 3 company may be a category 4 for someone else, since the information published is rather weak in most companies. That is also the reason the numbers presented in each category above do not account for every single member if you add the numbers. Therefore, the only definite category is category 1, which contains the companies that have published their greenhouse gas emissions.

The biggest surprise was how many companies that did not publish anything on their webpage. This includes information in reports or basic QSHE information on their websites. Roughly 50% of the companies, category 4-6, fail to deliver relevant information to the thesis, which is somewhat worrisome.

Category 1 companies:

Eidesvik Offshore ASA:

This company publish their CO2-emissions every year from 2011-2014 in the annual report. In all their reports from 2011-2014 they list the amount of CO2/NOX/SOX-emissions that the company is responsible for, but they also list the amount of resources used that contributes to the emissions. One example of this is the list of raw materials they use, and how its environmental impact is. Marine diesel affects CO2, NOX and SO2, but natural gas only affect CO2 and NOX. In the annual report from 2014 they inform us that they spent 28,033 tons of diesel, 23,425 tons of natural gas, and 813,772 liters of lubricant. The consumption of the resources amounted to 107,106 tons of CO2 emissions, 1,284,700 kg of NOX emissions and 34.852kg SOX emissions. The report from 2013, 2012 and 2011 follow a similar recipe where they list their emissions, and the resources consumed that was the cause for the emissions. In order to reduce their emissions to the external environment they have a list over what type of raw material is used, how it impacts the environment, and which measures they have taken in order to reduce their impact. The company have a program called EEEP (Eidesvik Energy Efficiency Programme) which is used to optimize operations, in order to reduce consumption.

Fred. Olsen Energy

The reports from Fred. Olsen Energy did not have any information about GHG-emissions in the annual reports from 2011 and 2012. In 2013, the company had a new section in their annual report called *Corporate Social Responsibility Reporting*. Here they say that CO22 emissions are continuously monitored and reported, and the CO2 emissions for 2013 and 2012 are listed. In the report from 2014, the emissions of CO2 were 140,899 metric tons, compared to 118,310 metric tons in 2013. The fuel consumption was 50,578 metric tons in 2014 versus 43,525 in 2013. There was no information available about NOX and SOX emissions in the annual report from 2011-2014.

Grieg Star Group

The Grieg Star Group did not report their emissions in the annual reports, but they have a section on their website, griegstar.com, called Corporate Responsibility. Here they have a diagram that list the CO2/NOX/SOX emissions in tons, in the time period from 2006-2013. The list have not been updated for the emissions in 2014. For the same time period you can also see the amount of fuel consumed in kilograms, and the number of vessels that was owned by the company. They also list their goals when it comes to reduction in CO2-emissions, and their goal is to reduce their emissions by 20% compared to the level of emissions in 2006. In the annual report from 2014, the company informs that the status by year-end 2014 is a 29,4 % reduction in energy consumption, measured by the EEOI CO2 Index. 11 % of the reductions in emissions are related to technical measures, while the rest is due to use of eco-speed. They achieved the goal to reduce energy consumption by 20 % in 2015, compared to the levels in 2006.

Havila Shipping ASA

In the 2011 and 2012 annual reports from Havila Shipping ASA, they have a detailed overview about their CO2 and NOX emissions. In the list we can see every vessel they own, and how much GHG they emit. The consumption of diesel and lub.oil is also listed for every ship, and in the end we can see the total consumption and total emissions.

This overview was not published in the 2013 report, and we get instead a short chapter explaining that they are monitoring their emissions, and are continuing to improve their environmental performance. There is no information about resource-consumption or emissions in 2013.

The annual report from 2014 carries many similarities from the report from 2013, and there are no numbers about their emissions. Havila Shipping writes that they keep environmental accounting that includes all kinds of chemicals, surface coatings, fuel consumption and destroyed waste. In 2014, their fleet consumed 64,266 cubic meters of fuel (Mdo), and have installed catalytic converters on new vessels to reduce their emissions of pollutants from diesel and other combustibles. One of the company's core strategies is to have a continuous focus on the environment and solutions that limit or prevent emissions of gases and other material.

Hurtigruten ASA

In the annual report from 2011, they have an overview of their CO2/NOX/SO2-emissions from 2009-2011 and we can also see how they are each month during the year. There is no further explanation of these numbers, just a diagram showing their emissions.

In the annual report from 2012, these diagrams are now gone. There is no information about how much they emit, but they have a chapter where they explain that the company is aware of environmental damage and is continuously working to improve their performance. In the notes, we can read about their membership in *Næringslivets NOx-fond*. Here they list the cuts in emissions that they have committed to.

In the annual report from 2013, they have listed the average consumption of fuel per nautical mile, which was 81.8 liters. This results in 228kg CO2 kg/nm, 4,2kg NOX kg/nm and 0,01kg SO2 kg/nm. The total emissions, or how many nautical miles they travel each year, is not listed in the report.

Any information regarding 2014 has not been obtained. It is either not published on their website, or it is difficult to find. Attempts to search for information regarding the year 2014 has failed with both searching on the company webpage, and Google-search. One possible explanation for this is the new ownership of the company.

Odfjell SE

In the annual report from 2011 and 2012, they have an own section called *Sustainable business is good business*. Here they list the total CO2/SOX-emissions, and also how much fuel that was consumed. The have also listed the classification of the fuel consumed. Most of the emissions are done at sea, but in a diagram they have listed the emissions coming from activities on land.

In the annual report from 2013, this section is now called *Sustainability Report*, but is a little different from previous reports. The diagrams are gone, but we can still read about the fuel consumption and the total CO2-emissions. Here we can also see that the calculations are performed in accordance with IMO MEPC Circular 864. This is in 2009 IMO's Marine Environment Protection Committee circulated guidelines for voluntary use of an Energy Efficiency Operational Indicator(EEOII).

The annual report from 2014 informs that the company have reduced their CO2 emissions by 8 %. Most of this reduction in emissions is caused by a decrease in the fleet size. In 2014, the emissions was close to 1,5 million tonnes CO2, based on the consumption of 90 vessels. Emissions of SOX decreased to 10,053 tonnes. This is an average of 0,12 grams per tonne cargo transported one nautical mile.

Prosafe AS

Prosafe AS do not publish information about their total emissions in their annual reports, but they have information on their website concerning these issues. In the annual report from 2014 it says that the company is actively trying to reduce emissions by investment in more modern and fuel efficient equipment, and continuous improvement in operating procedures.

On the company homepage, they have a list showing their CO2, CO, NOX, SO2, CH4 and VOC emissions from 2008 to 2014. The amount of consumed diesel is also listed in the same time period. These emissions are calculated based on the fleet's diesel consumption. They inform us that the amount of diesel consumed is largely depending on:

- Number of vessels under their management
- The fleet utilization
- The vessels' operation mode

This may be the reason why their calculated emissions are somewhat unstable; 20700 tons in 2008, 11850 tons in 2009 and 16300 tons in 2010.

Simon Møkster Shipping AS

This company has included an environmental report in all the annual reports from 2011 to 2014. In the reports they have listed the amount of fuel and LNG consumed, as well as the total CO2/NOX/SOX emissions. In addition they have included the factors that form the basis for the total emissions. For CO2 the factor is 3.17 for kg/kg oil, and this factor has been the same for the period 2011-2013. The only exception to this factor is the vessel Stril Pioner when it runs on gas, then the factor is 2.74kg/kg LNG.

The NOX factor varies from vessel to vessel, but is determined on either readings or template factor in accordance with Norwegian regulatory requirements. For SOX emissions the factor

is 0.0046, but is only applied to vessels running on diesel. LNG operations generates zero SOX emissions.

It is unclear what the factors mentioned earlier are in the annual report from 2014, since they are not mentioned like in previous years. In addition to these numbers, we also get a brief explanation about what these emissions are, and how they affect the environment.

Solstad Offshore

The annual reports from Solstad Offshore do not offer any information about greenhouse gas emissions that comes from their activities. Instead they have listed their certifications, such as ISM, ISO 14001:2004, ISO 9001:2008, Maritime Labour Convention (MLC) and International Ship and Port Facility (ISPS).

In their annual report, they give a brief description about their own environmental program called Solstad Green Operations. This program was started in 2009, and since then their fuel consumption has been reduced by 20 %. More information about this program is available on their website, and here they list their amount of green operations, liters of diesel saved, tons of CO2 saved, square meters of rainforests protected and the amount of money they have saved for their customers. In addition to this they have listed their top ten vessels with the best performance within this program.

Also on their website is a document called Corporate Social Responsibility, and in the section *Environmental and Climate Issues* is a link to Carbon Disclosure Project. The company started a carbon footprint analysis in 2009, and began reporting to the Carbon Disclosure Project in 2011. Everyone can make an account on Carbon Disclosure Project, and see information submitted by companies to the site. There is a significant amount of information submitted to this site by Solstad Offshore, regarding greenhouse gas emissions. The emissions are divided into three different scopes, where scope 1 and 2 are direct emissions such as transportation and purchased electricity, and the third scope are indirect such as work travels and suppliers. Emissions factors for fuel/material/energy are listed, and their factor for marine gas oil is 3,2. In addition to this their total emissions are listed, but also how there are spread over different national territories, 24 in total in the report from 2014. There is much more information available in the reports listed on Carbon Disclosure Project that will not be mentioned here.

Solvang ASA

In every annual report released from 2011-2014, there is a CSR-section included. When it comes to environmental performance, they are informing the reader in general terms about their performance and the risks involved with shipping. Their policy is to reduce their emissions as much as possible, within realistic borders. They are continuously measuring their performance by using a number of different systems, and one of the most important Key Performance Indicators are how much fuel is consumed compared to the travel distance. Whenever possible, the speed of the ships are optimized to reduce emissions and fuel consumption under the requirements of the contract with their customers. The results from doing this, and other KPI's, have given good results in short time.

Solvang ASA has a modern fleet, and compared to ships of the same size 20 years ago, the fuel consumption is up to 40 % less in comparison. The company was certified and approved for ISO 14001 certification in 2010, and will continue the work to meet the requirements of this standard in the future. One of the main focuses is to reduce their bunker-consumption, which is the main source of the shipping industry' emissions of CO2, NOX and SOX.

The actual numbers of their emissions are not published in their annual report, but on their website. Here is a detailed overview of their resource consumption and other data from 2008-2014. Data such as total fuel consumption HFO, total fuel consumption MDO, total lube oil consumption and the number of vessels are listed for each year. The total amount of CO2, NOX and SOX emissions are listed from 2009-2014. In addition to these numbers, they have also added their target for 2015

Songa Offshore

In the annual reports from 2011 to 2014 they have detailed consumption of how much fuel each vessel have consumed, and how much CO2/NOX/SOX-emissions that each rig is responsible for. They also inform us that the protection of environment is considered as primary importance to the company. Great emphasis has been placed to meet all statutory requirements for emissions, pollution and environmental impact for their offshore facilities.

The company focus on meeting the requirements from the International Maritime Organization (IMO) with regards to environmental issues. All their offshore installations maintain valid certificates for International Oil Pollution Prevention (IOPP), International Air Pollution Prevention (IAPP) and International Sewage Pollution Prevention (ISPP).

Technip Norge AS

In 2013, the company released their own *Activity and Sustainable Development Report(What if people were the key to our success?).* This report is 85 pages long and contains information regarding all the elements in Triple Bottom Line. It seems they did not publish sustainability reports from 2011 and 2012. In the 2013-report, we get information that they support efforts to minimize greenhouse gas emissions and reduce their environmental footprint.

In the Environmental Indicators-section of the report, we get a detailed overview of their consumption and production. The numbers are divided into several different categories such as construction sites, industrial sites, fleet and offices, and the total from these categories. The total results from 2012 are also listed next to 2013 for comparison, but not for the individual categories. They have also included how much their GHG-emissions are for every hour, and these numbers include 2011, 2012 and 2013.

The annual reports from the company contains much of the same information that is available in the 2013 sustainability report. The total emissions are shown to us, but with less information compared to the sustainability report.

In 2014 they released *Delivering Results – Activity and sustainable development report.* This report is 99 pages and is very similar to the report released in 2013.

Torvald Klaveness

Any reports from 2011 are not available on the website, only the annual reports from 2012, 2013 and 2014. In the annual report from 2012, the total CO2 emissions are listed in the Corporate Social Responsibility-section of the report. These numbers range from 2010-2012, and a short explanation is given to the numbers. Their main focus was emissions to air in 2012, and contributed to a global industry standard by agreeing to report using a standard set of parameters. This was done together with four other ship owners, FRAM project.

The annual report from 2013 differs from the one released the previous year, and the Corporate Social Responsibility-section is removed. This year they have a section called Health, safety and environment, but no numbers about the emissions. The fleets energy efficiency has on average improved 4,3%, compared to the baseline in 2012, so it may give some indication what the emissions in 2013 are.

In the annual report from 2014, there is no information about emissions or environmental impacts. The section Health, safety and environment instead mentions briefly about incidents, passed inspections and piracy activity in the Indian Ocean.

Uglands Rederi / The J.J Ugland Companies

This company does not publish their annual reports on their website, but they have environmental reports from 2013 and 2014. The reports are made in accordance to Global Reporting Initiative 2013 (GRI – G4). In the report they show us the total fuel consumption (mt), fuel (g/mtkm), and energy (Wh/mtkm) for each vessel in the time period from 2010-2014. The total CO2/SOX/NOX- emissions from each vessel are also reported in the same time period.

They have also calculated their environmental impact from office operation, and show the total release of CO2 emissions from the company in 2011-2014. The reporting of emissions to air was limited to the effect of employees travel activities, and the use of an oil fired boiler.

Compared to other companies, these reports have fewer pages than many of their competitors. The environmental report from 2014 is only 11 pages in total, but it “cuts straight to the point” regarding emissions, measures etc.

Wilhelm Wilhelmsen ASA

In the annual report from 2011, there is not much information about GHG-emissions, but they have a Health, Environment and Security-section with some information. They inform us that the fleet reduced its emissions in 2011, decreased fuel consumption per cargo unit transported(1,6%), slight increase in NOX emissions and SOX emissions were stable.

In 2012, they made an environmental report which was also included in the annual report the same year. They had a new reporting system, the Performance Monitoring Analysis (PMA), which made them able to meet a substantial part of the required reporting from vessel to office. This system was installed in all their vessels. The total CO2/SOX/NOX-emissions from 2005-2012 is reported, as well as the g fuel/tonne nm.

In 2013, the environmental report was not included in the annual report, but there was still much information about sustainability in the annual report (compared to other companies). This year saw the first development of reporting according to Global Reporting Initiative (GRI). Indicators here are G4-EN19 and G4-EN21 for reporting emissions, and it was full disclosure. Unlike 2012, only the CO2/SOX-emissions was reported this year, with a timespan from 2005-2013.

The reports from 2014 follow the same pattern from 2013, information concerning sustainability is described in detail in its own report. In 2014 they reduced NOX emissions with 11,1 %, SOX with 8,9 % and CO2 by 8,9 %.

Company	2014			2013			2012			2011		
	CO2	SOX	NOX	CO2	SOX	NOX	CO2	SOX	NOX	CO2	SOX	SOX
Eidevik Offshore AS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fred Olsen Energy ASA	Yes	No	No	Yes	No	No	No	No	No	No	No	No
Grieg Star Group	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Havila Shipping ASA	No	No	No	No	No	No	Yes	No	Yes	Yes	No	Yes
Hurtigruten ASA	-	-	-	No	No	No	No	No	No	Yes	Yes	Yes
Oddfjel SE	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
Prosafe AS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Simon Møkster Shipping AS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Solvang ASA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Songa Offshore	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Technip Norge AS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Torvald Klaveness	No	No	No	-	No	No	Yes	No	No	Yes	No	No
Uglands Rederi	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wilhelm Wilhelmsen ASA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No

Table 2: Summary of companies that have published information about GHG emissions

Category 2-6:

There was no available information about GHG-emissions in the remaining companies in the members list of Norwegian Shipowners Association. This does not mean that the information does not exist, but it is likely that the information has not been published for everyone to see. There is also a chance that the information has been published, but was missed due to human error.

Companies in this category have reported very general information about topics related to sustainability / triple bottom line, but not as detailed when you compare it to the companies in category 1. One such company is Knutsen OAS Shipping AS, which do not publish their annual report on the internet, but still have a section about QSHE on their website. In the section about environment, the company informs that the stated policy of Knutsen OAS Shipping AS is to *"..pay appropriate regard to the environment by acting to preserve air, water, soil, plant life and animals from adverse effects and to minimize any nuisance that may arise from our activities. We also believe that accidents – being harm to people, the environment or physical damage – don't just happen, and are preventable"* (Environment 2015).

Further in the section, they inform that the company has a strong focus on environmental issues, and they list their certifications ISO 14001:2004. Their target is to have zero pollution incidents, and have also established a plan over five years that includes six environmental projects. Their fleet has eleven offshore tankers that are approved by Green Award, which shows the company's commitment to an environmental policy.

An example of information about QSHE in annual report is found in the 2014 annual report from Vollstad Shipping. The company does not publish their greenhouse gas emissions on their website, or annual report, but also have some basic/general information about QSHE. Here they inform that the company's activities have an effect on the environment to a limited extent. Their activities results in emissions to air and sea, and also produces waste. The fleet's fishing vessel and four of the offshore vessels have had their NOX emissions reduced by up to 98 % since they have installed catalytic converters. In the end, they give information about the trawler that was delivered in June 2013, which had installed catalyst for exhaust gas purification and ice-strengthened hull for increased safety and reduced risk of discharges. On their website they have published different certifications and standards, such as: ISO 9001:2008, ISO 14001:2004, International Ship and Port Facility Security Code and others.

The examples shown from Knutsen OAS Shipping AS and Vollstad Shipping are how the information is represented from companies in category 2 and 3. Some companies have more information, while others have less detailed information. What they have in common is that there are no numbers regarding their greenhouse gas emissions. Companies claim that they are aware that their operations have some impact on the environment, and that it is something the company care about. However, it is difficult to tell how truthful these claims are, since there is no published information about how they perform when it comes to greenhouse gas emissions. Compared to companies in category 1, where it is possible to compare the emissions from one year to another, this is not possible with the available information presented by the companies in category 2 and 3. Rather than focus on greenhouse gas emissions, many companies have sections about working hazards, safety, social aspects and oil spills in the sea.

Companies in category 5 can be considered not important for this research, even if they are members of the Norwegian Shipowners Association. Companies such as A/S Borgestad ASA is a company that focus on investments in property and industry. While they are responsible for greenhouse gas emissions to some degree, it is not something that is focused on in such industries. Another example of such a company is ESS Mobile Offshore Units AS, which focus on supporting the industry with personnel that can do tasks such as cleaning, cantina, reception, nurse etc.

Category 6 contains of companies which do not have any webpages. The only exception is Polycrest A/S which have their site under construction. Gard Shipping AS has bought a domain under www.gardshipping.no, but their webpage did not contain any information (blank page). Therefore, it is difficult to say how they publish their information, both financial and environmental.

5. Results and discussion

The findings in this research have shown that there are major differences between the members in the Norwegian Shipowners Association on how they report their greenhouse gas emissions. Before the research began, it was expected that there would be some differences between different companies among their reporting practices, but these differences was greater than predicted beforehand. On the other hand, we can argue that there are not major differences among the members, since the research has shown that most companies do in fact not publish their greenhouse gas emissions. The companies who actually do report their emissions are in a small majority compared to the other members. Only 14 out of 152 companies have published their greenhouse gas emissions, which is 8,5 % of the members. This number changes if you take into account companies publishing information related to QSHE, which rounds up to roughly 50 % of the total members. Once again, remember that the companies listed as publishing information regarding QSHE were approximates. The reason behind dividing the companies in this matter was because of difficulties drawing the line where a company would be classified as a reporting/non-reporting company of QSHE-information. Some companies had very poor information regarding QSHE, but were on occasion given the benefit of doubt when placed in a category. This means that other researcher could put the list together in a different fashion, and have a much stricter line of what qualifies, and don't qualify, as a company that publish this kind of information.

Greenhouse gas accounting:

In the Norwegian Accounting Act, Section 3-3a, Subsection 11 it is stated: *" The board of directors is obligated to report on the following conditions: "Information concerning current activities, including production inputs and products, that could cause a not insignificant impact on the external environment shall be provided. Information on the types of environmental effects the different aspects of the operation have or could have, and what measures have been implemented or are planned to implement to prevent or reduce negative environmental effects shall be provided"".* The most important part in this section is *"..cause a not insignificant impact on the external environment shall be provided".* This means that by the law it is mandatory for Norwegian offshore shipping companies to report activities that could potentially harm the environment.

Judging by this section alone, it could seem that most of the Norwegian shipping industry is breaking the law, but in reality they are still operating within the law. The reason is found in the details in the section, which do not explicit demand that companies publish their greenhouse gas emissions, even if greenhouse gases can be considered to cause a not insignificant impact on the external environment. If they in fact were breaking the law as a reason of not including greenhouse gas emissions, different environmental organizations would probably make sure that the companies were reporting within the requirements of the law. This was confirmed by one such organization, which did not see this as a violation of the law. Environmental transparency is considered important by them, and an employee in the organization said that *"We support the work for shareholders and the public to get knowledge about environmental impacts linked to all organizations, including the maritime sector. However, [Company] has more to gain by getting organizations to adjust their production processes and energy consumption rather than wait for an annual report"*(Informant 1).

This is the reason that many companies write about their environmental impact in very general terms in their published reports, because that is all that is necessary to act within the requirements of the law. It can be argued that most of the information published this way is not very useful, since it only speaks on general terms. When a company informs us that they care about the environment and that they try to avoid harming the external environment, it is not surprising to see for the reader. If it was the other way around it would cause some attention, but it can almost be considered a standard statement from any company that they

care about their surroundings. This does not only include shipping companies, but all different sorts of businesses.

When it comes to what the greenhouse gas reports should include, the employee in the environmental organization said that *"A complete overview of the greenhouse gas emissions should include construction, use and disposal of ships, emissions connected to maintenance, rebuilding and certainly the onshore activities etc."* (Informant 1). It is difficult to say if the companies include this in their greenhouse gas reporting, since the most common way to measure greenhouse gas emissions is to look at the amount of fuel consumed, and then convert those numbers into different emission categories. There is one exception here, which is Uglands Rederi/ The J.J Ugland Companies. This company have calculated their environmental impact from office operations, which show the total release of CO2 emissions from the time period 2011-2014. The calculations were based on employees business related travels, and the use of an oil fired boiler.

An advisor hired in the Norwegian Shipowners Association presented this table for calculating CO2 emissions from the shipping industry. The way emissions are estimated is looking at the amount of fuel that has been consumed, which is then converted to fuel equivalents to be multiplied with a factor. According to this advisor, the table was well recognized in the industry:

- CO_2 Conversion Factors, C_F:

Fuel Type	Carbon Content	C_F (t-CO_2/t-Fuel)
Diesel/Gas Oil (DGO)	0.875	3.206
Light Fuel Oil (LFO)	0.86	3.15104
Heavy Fuel Oil (HFO)	0.85	3.1144
Liquified Petroleum Gas (LPG)		
Propane	0.819	3.000
Butane	0.827	3.030
Liquified Natural Gas (LNG)	0.75	2.750

(Source: Sent by email from Norwegian Shipowners Association)

This table helps to calculate carbon emissions based on the amount of bunkers used within the shipping fleet. Basically it is not more complicated than measuring the amount of fuel

consumed, and then calculates it based on the different factors for each resource consumed. *"We measure it with our fuel consumption, and report it daily. Then we just calculate it with an equation how much CO2, NOX and SOX emissions"* (Informant 4)

All the informants in this research paper stated that they have automated systems that monitor their fuel consumption. *"We have a program called [program], and those who made it have provided suggestions for factors such as CO2 and NOX. When it comes to NOX, which we are forced to report to the authorities, we have a factor that is approved by Sjøfartsdirektorated based on real measurements"* (Informant 4).

The level of details is up to each company to decide, and these automated systems gather more information than what is actually needed in order to calculate the greenhouse gas emissions. *"It is not more complicated than you make it, but of course, the amount of accuracy you choose in your reports can make it complex. The ships know how much fuel they consume and they report it daily to the companies through something called noon-report. Noon-report is standard in 95% of large ships, with the exception of towing-boats and perhaps other small offshore ships that do not use these reports. For all others it is normal that they report at 12:00 the last 24 hours of activity, how much fuel is left in their tank etc. to the companies. Of course, these reports contains inaccuracies, but that's just the way it is"* (Informant 6)

Other parts of the systems can pick up data such as weather, wind etc. that can add to the data collected, but also gives a more complicated system to calculate. *"If you look at some companies that use energy-effective activities, some of them get real-time data from their ships from servers on board. The servers send information about the consumption on the main engine, about wind and weather and all kinds of stuff. The information is online and put into a database"* (Informant 6)

What is the information used for?

The measurement of fuel consumption contributes to the calculation of greenhouse gas emissions, but the main priority of these calculations seems to be to monitor the performance of each vessel. Like one of the informants said during the interview, nature is constantly fighting you and making you perform worse every day. *"Those that measure, at least many of them, use it for showing trends and when the vessel is outside its defined conditions in comparison to what affects fuel consumption. It has to do with maintenance etc. They look at the trends in increased resistance on the vessel, or parts get worn out, or their propels needs cleaning. When you get statistical data on this, you can see the curve when the vessel is approaching a new dry-docking, by for example looking at the tear and wear that increase your consumption"* (Informant 6)

Performance can be closely linked to greenhouse gas emissions, and if your emissions are going down, the same thing has probably happened with your resource consumption as well. The exception here would be decreased economic activity or for example reducing the fleet size. *"We mostly use it to see if our performance is better next year, if we can achieve our goals"* (Informant 3). This was also confirmed by another informant, that these numbers are used for benchmarking in order to see their performance develop over time. In addition to that, the numbers were also used in marketing in order to attract more customers. *"Yes, we do that as well. What's normally most valuable is fuel consumption. If you can make better ships than your competitors, which use less fuel, then it has a value. It has obviously a value to use ships that consume small amount of fuel, and we use that for all it is worth"* (Informant 3). This was semi-confirmed by another informant, but was not quite sure since that person had little to do with the marketing-department of their company.

All of the emissions have to be reported to the authorities, which means that the government has overview over the emissions from every company since it is mandatory to report this. In addition to reporting to the government, the members also report their emissions to the Norwegian Shipowners Association. *"We use it to report to the authorities and customers. The customer is of course devoted to fuel consumption, and sometimes the customers has to report to the emissions further, CO2, NOX and SOX, but that is out of our control. We report the fuel consumption to them, and then we provide assistance if we get questions about what the emissions are"* (Informant 4). What is interesting about these reports is that none of those who receive these reports inspects the number or similar. Based on the interviews, the numbers are simply just collected and that's it. There are no watchdogs that monitor this and

can raise red flags if the emissions are increasing by a large amount or something similar. The numbers are collected, and can then be represented later in reports with the total amount of emissions from the industry/members.

Comparing greenhouse gas emissions

Among the companies in the Norwegian Shipowners Association, only Simon Møkster Shipping AS informed in their annual report how they converted and calculated their carbon emissions. Simon Møkster Shipping AS reported their emissions with an factor of 3,17 for oil. It does not however specify if it is diesel/gas oil (DGO), light fuel oil (LFO) or heavy fuel oil (HFO) as the table presented by Norwegian Shipowners Association shows. It is interesting that there is a slight difference in the factor presented by the company in the annual report, and the table presented by the Norwegian Shipowners Association. In comparison to Solstad Offshore, they listed their factor for marine gas oil to be 3,2. The difference between Solstad Offshore and Simon Møkster Shipping AS is only 0,03. This can imply that there are slight differences among each company on what value they choose to use in their calculation of greenhouse gas emissions. In theory, two different companies can have the exact same consumption of oil, but report different amounts of emissions since there are variations in the factors used to estimate the greenhouse gas emissions.

If two companies have the same consumption of resources that are responsible for greenhouse gas emissions, but report different numbers, it can be argued that the company with lower greenhouse gas emissions gains a competitive advantage. Companies that have higher greenhouse gas emissions risks negative cash flows by paying carbon tax, payment of carbon permits or even emissions penalties (Li et.al 2014). Companies can then feel tempted to operate with lower factors in order to attract investors and customers, when they in reality are not any more efficient than their competitors. However, this does not mean that for example Simon Møkster Shipping AS used a lower factor deliberately. According to one informant, there are some different ways to calculate your emissions; *"3.17, 3.18, 3.19 and 3.20. There are some different ways to do this, and it's only decimals.. We have organizations and third-part actors that help us verify our data, and then list these in reports"*(Informant 3).

Another problem with just publishing the amount of greenhouse gas emissions is that the companies only, for the most part, publish their total amount of emissions. Some companies publish the amount of fuel/oil consumed during the year, and have estimated the greenhouse gas emissions based on that amount of consumption. However, this makes it difficult to tell the background of these emissions. There are also many things the companies can do in order to affect the greenhouse gas emissions. *"There are a lot of different things you can do. Invest in cleaner equipment to reduce your emissions. But you have to work with your employees to make them understand this topic. Let's say we have four or six engines on a ship, is it necessary to run all at the same time? Can you shut down two of them? We also work to get more optimal consumption of fuel, and have systems that log this performance to get our engines more effective"* (Informant 5). There is a long story behind the emissions, but it would take a large amount of work to explain the history behind these numbers. *"The company is able to take energy-effective actions within the parameters that the customer has set in the contract, and many companies are doing this"* (Informant 6)

In comparison to financial reports it would be to only publish the total amount the balance accounts for. A company can report that their balance equals to five hundred million NOK, and only that number. That would make it very hard to say anything about how the company is doing, since we only know the total number, not all the parts that make up for that number. How much of their assets is cash? Will they be able to pay the next their next bills, or are almost all of their assets tied up in real estate, buildings and ships? Perhaps an extreme example, but it makes the point. This is the same results which Nielsen et.al (2007) found when they studied six companies in Denmark. Comparison among different shipping companies is impossible judging by these numbers alone.

On the other hand, it may be very difficult to compare these companies against each other, even if more information were available about their environmental performance. *"The total greenhouse gas emissions are interesting enough, but they do not give a picture of what you are doing and that kind of stuff. Certainly you will always have CO2-emissions, and for example one ton of fuel generates approximately 3.1 ton co2. That's pure mathematics, it's just the way it is. It provides you with very little, because so what? What's important is the kind of work you are doing"(Informant 3).* When asked the question if it is possible to compare companies based on greenhouse gas emissions, Informant 1 replied *"Not even close. This is what is considered a bit dangerous, and one of the problem-statements is EU that's*

working on a program that reports CO2-emissions that you have to place on your work. That's where the complexity starts, because what are you really comparing? (Informant 3).

Isaksson et.al (2009) encountered the same problem when trying to compare the performance of different companies within the same industry. One suggestion was to make an industry benchmark to compare companies against, but this might be a difficult task to achieve in the shipping industry. *"We have been thinking about comparisons among companies, but we have not found any companies yet to compare ourselves with. It provides little value, and in reality it would probably confuse a lot of people and generate a lot a questions we have to answer"* (Informant 4)

The informants were asked to give their opinion about why there are differences within the Norwegian shipping industry when it comes to reports involving greenhouse gas emissions. *"It explains itself. First of all, it is very difficult. You can report and compare with yourself, but when you are going to transfer it to something that makes sense it becomes very difficult.. It sounds so easy, but one example of this is when a boat is in docking and you operate it for five years. The boat will run more inefficient every day because of slime etc. Then you do a big job in docking and reset the boat, in a way. Therefore talking about reduction in co2-emissions from month to month is not useful, you can only adjust speed to affect that. But in a five year period it is comparable, to see if we actually have improved and achieved lower emissions"* (Informant 3)

This is what Bowen et.al (2011) is writing about, when they explain the need for an accounting system that needs to be fully functioning. While the measurement technique can be said to be fairly accurate and reflect the actual atmospheric emissions with agreed procedures verification, it is difficult to say that this allows for a valid interpretation of data. With all the different activities the shipping industry is capable of doing; it is unfair for certain companies to look at emissions alone. The interpretation of the data need more background information in order to make a valid judgement on whether someone is performing in an efficient or inefficient matter. *"It has to be a factor or value that is based on an activity. Is the ship plowing for a gas-line or just inspecting it? You get two very different amounts of emissions from those two activities"* (Informant 4). These factors that Informant 4 is talking about do not exist as of today. So this means that if two identical ships from two different companies were performing these activities, the company who is just inspecting the gas-line will look much better on paper with their greenhouse gas emission report. *"One*

example of this is two identical ships, which are put on time-short for two different customers. One of them will ship feathers, which is large volume but low weight. The other ship will transport raw-iron, which is then completely maxed out on dead-weight on board. The ship with raw-iron will appear much more effective since it transports a lot of heavy weight, and this is fundamentally unfair for the ship that transported feathers. If these were two competing companies, then you would put your faith in continuous business based on what customer you have and what he wants you to do" (Informant 6).

This is one of the issues that Gray (2010) mentions where organizations do not want accounts that can threaten their credibility. All the informants mentioned the troublesome and worrisome nature of publishing these numbers, since it can be very complicated to interpret the numbers in a valid way. A company that publish higher emissions than other companies may be interpreted as a worse company by people who read these reports. What Gray (2010) also say is that companies can claim in their reports that they are sustainable, but in reality they are not. The reports are just written in a way to try and convince the reader that they are doing an excellent job with their environmental/sustainable performance. This is also mentioned by Hopwood (2009) that companies may feel tempted to reduce what is known about their environmental activities, which will also help create the construction of a better image of the company. Based on the information from the informants, it is probably not the cause that the companies that are not publishing are trying to hide their information. It seems like that the companies that do not publish do not find much value in it at the moment, that the numbers do not have any important significance. The companies that do publish wish more transparency and perhaps also be a part of the group of companies that publish this information. *"It's based on transparency. We are ISO certified, and we are working with it and it gives something back when you are open about it. We show our customers that we have full control about what we are doing, down to the decimals. It's connected to being a quality supplier"*(Informant 3).

Having an ISO certifications do not mean that the company needs to publish their greenhouse gas emissions; the company can choose their own level of reporting. An ISO 14001 certification says that you should identify your most significant greenhouse gas emissions, but you can keep the numbers for yourself if the company chooses to do so. This is explained by Bracci et.al (2013) that these standards do not put pressure on the companies to achieve certain results, but can prescribe details of enabling elements. The goals are up to each individual company to set, and achieve, which can be a double-edged sword. While it is good

for companies to get certifications such as ISO 14001, the ability to set their own goals can cause companies to set the barrier to low. A good portion of the companies in Norwegian Shipowners Association mention in their annual reports or websites, that they are ISO-certified and are involved in activities that tries to minimize their impact on the environment. Showing that you have certifications such as ISO helps create and build the image that the company is accountable for their actions, but is at the same time questionable since you are able to set your own goals. Companies that have poor performance may set lower goals in order to achieve them, and then write in their annual report that they have achieved 100% of the environmental goals during the last year. This does not necessarily mean that companies in this research paper have set lower goals in order to achieve them, but it is something to keep in mind when you read reports from companies that show you that they have this certification.

Take for example Odfjell SE that were responsible for 1,5 million tonnes of CO2 in 2014, and then compare it to the CO2 emissions from Eidesvik Offshore ASA that emitted 107,106 tons of CO2. These are two very different numbers, and judging by the number alone some might think that Eidesvik Offshore ASA is doing a much better job when it comes to CO2 emissions. This does not necessarily mean that it is true, that a company that pollutes less is doing a better job compared to companies that report higher emissions. Since we are only shown the numbers, there is no way to see the story behind the numbers. Eidesvik Offshore ASA does share their consumption of resources that year, and in 2014 they consumed:

- 28,033 tons of diesel
- 23,425 tons of natural gas
- 813,772 liters of lubricant

This gives a better illustration about why the numbers behind the emissions are the way they are, but it does not tell anything about efficiency. For all we know, this company may use outdated ships or other obsolete technology that consumes much more resources compared to modern equipment that is used today. *"In a way it's a silly number to publish, since it does not tell you anything before you can put it up against the activities you've done to cause the emissions"* (Informant 4)

If we go back to Odfjell SE, and look at their 2014 report, they inform us that they have calculated their Energy Efficiency Operational Indicator (EEOI) since 2008 at ship and fleet level in accordance with IMO guidelines. In 2014, the EEOI for their fleet was 17,9 grams of CO2 per tonne cargo transported one nautical mile. It is easy to compare the level of fuel consumed for different companies, and tell who consumed the most, but not easy to tell which company is more efficient. With an indicator such as EEOI, it makes it much easier to compare companies and see who's winning the race in becoming more efficient regarding greenhouse gas emissions. This indicator is by no means perfect either, since many variables can affect how effective different sorts of goods can be transported, but it still gives a better impression about the company's performance compared to only listing the amount of resources consumed. One employee in an environment department of a company that do report greenhouse gases explained it like this: *"When the amount of cargo to be transported falls, the utilisation level of the vessels also falls, which means they become less efficient. Think of it this way: If you wanted to move a vessel with 100 cars onboard vessel A to B it might take 100tonnes of fuel. However if the same vessel had just 1 car onboard and made the same trip, then it will not consume just 1 tonne of fuel, but probably closer to 70 tonnes. Of course the relative CO2 performance in the latter case will be much worse than in the former"* (Informant 2).

Odfjell SE improved their CO2 efficiency in 2014, and it was mentioned in their report. This is also supported by Olsen (2010), which claims that positive progress is easy to publish in reports, but that negative progress of failed attempts can often be left out. This could be one indicator about why so few companies actually publish their greenhouse gas emissions, since there is a chance that some of them would only have negative information for publish. It may be bad for business to publish information that shows that not only do you perform poorly, but it is not improving compared to previous years. Or perhaps even worse, that the emissions are steadily climbing up from year to year. A company that publishes information about the resources consumed can defend an increase in consumption by saying that business increased during the year, and as a natural result the consumption increased. It would be harder to explain an increase in an indicator such as EEOI, since it shows the emissions released per tonne cargo transported one nautical mile. It could be as simple as business decreased during the year, and the ships could not exploit their full capacity.

On the other hand, it is also possible to argue that increased greenhouse gas emissions from the shipping industry are a good thing. Shipping cargo by sea is more environmentally

friendly in comparison to many other means of transportation, such as trucks or airplanes. *"If you take a closer look at a ship, it will have higher emissions during a good year. The ship is sailing on active operations all the time. During a bad year the emissions will be lower, since the company may have lost money or the ship is a lot in dock. In a way, that means that it is positive that the emissions are higher"* (Informant 6).

Consequences for publishing:

For the companies that publish their greenhouse gas emissions, there is no turning back once the numbers are out there for the public to witness. Once the numbers are out, the companies may have to explain the reasoning behind increased or decreased amount of greenhouse gas emissions. While it may be easier to publish emissions when they have decreased from previous years, the stakes are higher when you publish emissions that have increased compared to previous years. There can be several different reasons for both increased and decreased emissions. During the financial crisis from 2007 and the following years, several companies that reported their emissions showed a decrease during that time period. This decrease was not mainly a result of increased efficiency among the companies, but rather a decrease in activities that involved shipping. There were not any new fantastic innovations that reduced their emissions, but simply less customers that were in need of their service.

The motivation for publishing such information can be many, and Informant 2 explained it like *"..it is primarily because we actively work to be the industry frontrunner on environmental performance. Firstly, we believe it is a strategy that will produce the best overall result environmentally, economically and for the communities where we operate. Secondly we believe that by striving to exceed our obligations today is a very good way to mitigate our cost and risks for tomorrow"*. This also lines up well with what Are Severin Ingulfsvann explained during one of his lectures; the amount of information in your CSR-reports may exceed the requirements and expectations today, but can easily become the minimum requirements in a few years. Trying to improve environmental performance can involve great costs, with large investments in upgrading the fleet etc. *"Not to put too fine a point on it, it has cost a substantial amount and demonstrates that we believe in good deeds as well as fine words"* (Informant 2). This is also supported by Johnson et.al (2011) that claims that a business have to innovate constantly in order to survive. In many ways it is better to be proactive rather than reactive, since there is a lesser chance to get caught off guard. One benefit of being reactive is that you can look at others that have done the same job that you are obliged to do, and can copy much of the work they have done in order to meet the

requirements. *"Whether the companies want it or not, the new reporting-system from EU will happen within four years. After that there's no way for the companies to hide anymore. Without saying for certain, but I believe if you are not ahead of the curve by then, you may be in a position chasing from behind. In any case, I believe it's better to start early with this"* (Informant 5)

One informant also stated that they had very positive consequences for publishing information about their environmental performance, since it shows the customer that they have full control over their own fuel consumption. *"Positive! We can enter a meeting and talk about what we are doing. We are a supplier that shows we have control. Carbon emissions equal fuel consumption, and our customers are very interested if you know how to calculate this. Lower emissions means environment, but also economy. Now you have something, and it's not everyone that can say that"*(Informant 3). When companies publish environmental performance, there is a chance that the information may be misused with good or bad intentions. The problem is that some may draw comparisons based on incorrect premises, and comparisons between companies is a very complex matter. The individual ships are different, and the cargo transported can have big variety for certain companies. Based on cargo, a larger ship will have lower greenhouse gas emissions in comparison to a small ship with cargo. The issue is that the larger ships may not be able to enter certain docks because of their size, and then they are forced to use smaller ships to be able to deliver the cargo. *"The large ships cannot enter the small docks, and opposite. This is adjusted by trade that is restricted by the size of docks and terminals. The smaller boats looks like a disaster, but those are the only one's that can be used. Not the larger ships. This is something that needs to be handled with care, otherwise it is easy to draw the wrong conclusions"* (Informant 3). As a result, the emissions are increased, but could in reality be lower if a larger ship was able to enter the dock. *"That's where the complexity sort of begins, because what are you really comparing?.. It's difficult, and you can sort of only compare with yourself"* (Informant 3).

Another interesting example given by the director was during the time-period when piracy was a significant danger outside the coast of Somalia. As a result of this danger, all their ships had to travel at a higher speed than normal in this area, which resulted in a large increase in greenhouse gas emissions. This is not mentioned in any of the reports, and he explained that was one of the main problems with publishing greenhouse gas emissions. The number is not useful for much, on its own. For someone outside of the industry the increase in greenhouse gas emissions could possibly be viewed as poor performance, but the reality was that they had

to increase the speed for their own safety. *"We are open about our emissions, and can explain them, but we do not give a closer explanation because then we would have to talk like we do now to understand it. We understand it, and can use it to systematically improve. We use it to get better ourselves. The scary thing about carbon emissions is if you cannot put it on the actual work you did when the emissions were generated"* (Informant 3)

According to Informant 2, their customers are also increasingly interested in greenhouse gas emissions because of the likes of Carbon Disclosure Project. This project is an initiative started by investors to aid them in understanding the carbon performance of prospective investment targets, and have become a cross-industry tool for reporting carbon. *"For example a car maker may be obliged to report their CO2 performance through CDP by their investors. To do that properly, they need to know the CO2 for their inbound and outbound logistics too, which is why they come to us to ask to report our CO2 in CDP"* (Informant 2). This example was also mentioned by Informant 3 in a different interview that used the example of Volvo, which is trying to map their environmental profile for their cars, from construction and all the way to the customer. Certain segments within shipping are very interested in seeing the shipping companies' environmental reports because of this reason.

Based on the information provided from the interviews, it could seem like it is scary to publish this information since it is easy to misinterpret the numbers. Apparently this seems to mostly be just fears of something that might happen, but in reality is not that common. *"We have never experienced anything negative. For us, it is some kind of monitoring of ourselves since we get questions about what we are doing. Sometimes they correct us, but we do as well as we can. There are many out there that have different methods, analyzes and other things, and it's not worse that we take that into consideration if they have improvements. This has helped us, without a doubt 100% positive experience"* (Informant 5)

By publishing this information, they show that the company has skills and knowledge in these matters. Other companies may have the same skills and knowledge, or even better, but since they are not publishing the information some stakeholders may not be aware of how they can contribute. *"We have been asked about different topics by the authorities, and that means a lot for us. Of course, it is not always we can contribute, but sometimes we have input to offer since people know us. They know what we are doing and what they can get an answer on. I believe the reason for that is our open policy"* (Informant 5). So by publishing this information, the company Informant 5 was representing is being able to cooperate with the

authorities that perhaps other companies do not get a chance to do. This way the company can address certain issues that people from outside the industry was not aware of, or perhaps did not think all the way through. It happens from time to time that theory that works great at the office proves to be a disaster when put out in real life. By showing what the company knows, it is easier to reach out to them and ask for guidance so that an example of office-theory that fails is less likely to happen. *"For the most part, it is communication and discussions that occurs when we are out travelling. Different actors come and ask about what we are doing, and that is a very good starting-point to tell them who you are. Very good method to start good discussions with others"* (Informant 5)

Consequences for not publishing:

Given the increasing focus on greenhouse gases and climate change in the media, you would think environmental reports would be of great interest for many different stakeholders. World leaders speak about the need to fight climate change, and hold meetings in order to stake out a plan for the future. According to one director, there was no pressure from other stakeholders to publish environmental reports or similar information. The only applied pressure originated from themselves, with increasing focus on fuel efficiency and environmental performance every year.

A different company explained that they experienced no consequences for not publishing their greenhouse gas emissions. *"Today we experience no consequences. I believe that if we would publish our emissions today, it would be more oriented toward building our brand, but I do not think necessarily that it matters that much to our customers. Rather it would matter for how the public view our company"* (Informant 4).

This is in somewhat contrast to Burrit et.al (2010) when he says that companies realize that social responsible activities makes good sense in business, and can be used to improve the economic performance of the company. Greenhouse gases and environmental related issues are a hot topic today, and should in theory have some impact on companies. It was therefore surprising to find out that the companies experienced no consequences for not publishing. On the other hand, this is in line with Birkin et.al (1997) where stakeholders are informed through different communication channels, and based on their needs and nature of information. Informant 4 had full control over their emissions, and could give their environmental emissions data to customers who asked for it. Since every member of the Norwegian

Shipowners Association report their emissions, it is therefore likely that every company can provide this information for those who are interested. They have just chosen to not publish it for everyone to see. Negash (2012) stated that it was not normal for companies to publish annual reports that contained non-financial quantitative data, and that sustainability reports were not following a specific standard or format. This observation was also found for the members in the Norwegian Shipowners Association in general, with the exception of the 14 companies that published their greenhouse gas emissions.

Stakeholder and greenhouse gas reporting:

The reports are of interest for many stakeholders, some more relevant for the organization compared to others. Different stakeholders have different needs, and not everyone can be pleased to the same degree when it comes to published information. One company that published their greenhouse gas emissions expressed that their most important stakeholders regarding reports about greenhouse gas emissions, leaving ownership aside, were their customers and staff/employees. Informant 2 said that *"[Company]'s owners are environmentally committed and ambitious. They want [Company] to be an environmental frontrunner among shipping companies and are willing to have [Company] take the necessary measures to ensure that is the case. These figures are closely watched by the owners as they are keen for the overall trend to be going in the right direction".*

A similar response came from Informant 1, but in their experience the only pressure for publishing this sort of information came from themselves. *"In a way, our experience is that there are none, to be honest. The government and the Norwegian Shipowners Association have a system to report in to, but it's in a way only nice to show to. But I don't think we get, I mean, there is no public interest for this"* (Informant 3).

If we connect this to what is discussed by Amran et.al (2014), where it's claimed that larger companies are perceived to have a higher amount of concerned and well-informed stakeholders who put pressure on them, it does not quite add up. From all the informants there was no one who expressed that they experienced any pressure from any stakeholders to publish their greenhouse gas emissions, or similar sorts of information. Those who did publish their emissions explained that it was only pressure from themselves that caused them to publish this, and improve on this from year to year. Amran et.al (2014) also states that businesses that are involved in industries that are environmentally sensitive tends to have

better reporting practices. While the shipping industry do have an effect on the environment, it is probably not correct to say that they operate in an environmentally sensitive sense, from a public view. In comparison to for example mining companies that wish to dump their waste in the sea, they experience a much tougher audience from the public since the pollution hits very close to home. The ships are only visible when in dock, and are out of sight when they are out on the sea. The media can blow up stories about a mining company dumping waste in the sea, but ships traveling around the world do not make great headlines. For the most part, the only way the shipping industry gets massive media attention is if a ship is captured by pirates, caused a massive oil-spill in the sea or have had an accident like sinking or run on shore.

This means, in many ways, that the shipping industry is mostly an invisible industry for the general public, and perhaps that is the cause that the companies do not experience any pressure from other stakeholders. *"I believe people would be more interested if these matters were closer to them. Take for example the dock in Bergen and people see ten ships staying there, and there is something coming out of the chimneys. Then the media will write about it, and then the public starts to take more interest in this, because in my experience the general knowledge about this is going up"* (Informant 5). Deegan (2007) talks about the social contract with the general public, and that they have to operate in a way that has support from the community. It can seem like this social contract does not exist when it comes to greenhouse gas emissions, and that the companies are free to do what they want regarding this aspect of the industry. The social contract, and building of legitimacy, is probably linked to more visible actions of the shipping industry with oil-spills and accidents in particular. If a company has an oil-spill that destroys the natural life for many kilometers of shore-line, the rage from the community will soon follow. But as long as the ships are just sailing by without any problems, this goes mostly unnoticed by the general public. This might also be the explanation on why many companies choose to publish the amount of sea-spills they have every year, because it is a focus on that in the general public. An oil-spill is very visible and easy to see with your own eyes, but that is not the case with greenhouse gas emissions. While they are visible when they exit the engines, they soon disappear up to the skies and leaves no trace.

Not surprisingly, the informants listed the customers as one of the most important stakeholders for their company. Without them, you have no reason to continue your business. *"The most important thing for us is that our customers are satisfied, it is because of them that we are surviving"* (Informant 5). One of the most important factors for them was fuel

efficiency, which leads to lower costs for them *"Our customers are for the most part interested in the efficiency of our ships, fuel consumption equals cheaper operations. That is the main focus for our customers. I believe that in general it can have a value to build such an image, but in comparison to our customers and the market, it does not have that great value"* (Informant 4). In a way, this can be directly linked to greenhouse gas emissions, since vessels that consume less fuel are also emitting less greenhouse gases in comparison to other ships. So in other words, the customers are very interested in companies that can low emissions of greenhouse gases, but for many of them it is perhaps by accident. It does not hurt the customer to be linked with a company that is performing well environmentally, but this was most likely not the main intention when the contract was signed.

"It depends on which segment you operate in. If you for example look at the companies in the dry-bulk segment that transport iron from a mine to a factory, there are not many in that line that have a focus on the public image since it's just a transportation of resources. The general public has no relationship to that product, they do not see the link between that and the finished product which is further down the line" (Informant 6)

"The product that is shipped from Narvik to somewhere else in the world, and get melted to metal in factories to the final product kind of disappears in the line. But if you look at the companies that transports cars, or similar, then the customer have an identified product that is being transported. Let's say a car from Toyota is being transported from Japan to Norway, then the transportation-process of that product is much more visible for the customers to see" (Informant 6)

Benau et.al (2013) explains that CSR-reporting had increased after the financial crisis, and that companies perceive CSR-reports as a valuable investment in spite of its costs. Many of the companies in the shipping industry do publish information regarding CSR, but the level of details among each company is very different. Shipping companies are not something the regular person on the street do business with, but companies like Toyota do their business with that regular person. While CSR-reports are important for both business to business- and business to customer markets, it is probably more important for companies such as Toyota to have a good image in the business to customer market. This can imply that CSR-reports are valuable for some industries, or parts of industries, while others may find little benefit in making and publishing these reports.

EU-directive in 2018

When asked about CSR-reports, the new EU-directive that is planned to be implemented in 2018 and greenhouse gas information can cause some issues for certain companies. Regarding this topic, one informant replied with: *"We have discussed this with the companies multiple times the last years, so it should not come as any surprise, but the shipping industry is like most other industries. Activities that only cost money is something you tend to wait a long time to accomplish. That's one of the problems with environmental-demands, it is only costs, it's not a revenue-generator"* (Informant 6). The industry knows that it is coming, but the details of the directive are not completed yet. Based on the information provided in the interviews, this new directive forces every shipping-company to put a carbon-footprint on their activities. These footprints enables easier comparison among companies, but the fear is that the necessary tools to calculate these footprints are insufficient. *"What we and the industry are worried about is that the companies will get hold responsible for something they have no control over, which is then fundamentally unfair"* (Informant 6). There are many different activities at the sea, and some of them are easier to compare than others. One problem that Guenther et.al (2010) states was the missing international carbon and reporting standards, which made it difficult to compare data sets from different companies. The new EU-directive may be the solution to this, but it is still uncertain if it is sufficient enough. According to Andersson et.al (2014), the de facto standard for corporate carbon footprint reporting is the ISO 14064 standard, but the shipping industry have not adopted this standard as much as ISO 14001.

"The traditional shipping-industry is in a way the easy one that transports cargo from destination A to destination B, and you can look at the distance traveled or for example the amount of cargo it can ship. But in offshore and rig, there are two problems. First of all, when the ships are operative, they do very different things and none, or very little, has anything to do with transportation of cargo. Second, when these ships are on contract with a customer, the owner of the ships no longer have control over how the ship operates" (Informant 6)

There can be many different reasons to why companies choose to not publish this kind of information, and the different informants provided some different views on this topic. Like seen from Informant 6, one possible cause can be that many of them see this as something that only involves cost, and do not help the company to increase their revenue. This may not be necessarily 100 % true, since publishing this kind of information can help with branding and

for example create a more positive public view of the company. Another more financial example was provided by one informant, which should be of interest for the shipping industry and other industries in general. *"There are some investors and brokers that are interested in checking this kind of information. It is because their portfolio needs to contain a certain percentage of this and that character. That makes it important for our company to know what we, as a company, stand for, so it can match their portfolio" (Informant 5)*

It is in examples such as this that many other companies should feel tempted to start with their own reporting, in order to attract investors that are seeking for companies that can match their portfolios. The difference between publishing and not publishing information about greenhouse gases can be that investors seek the companies that do publish this kind of information. Even if the company that do not publish have a better performance in comparison to the company that do publish, they may be ignored since the investors found what they were looking for in the company that did publish their information. On the other hand, this can also go both ways. If a company suddenly started to publish information about their environmental performance, it may scare investors away to other companies. Suddenly they realize that the company they invested in have a very poor performance, and is in need of heavy investments in more modern equipment in order to meet the new environmental targets set by authorities. This is of course only one of many other possible answers to why there are differences, and one informant thought that many of the companies that do not publish may be a bit scared to dive into this kind of reporting. *"First of all I believe the reason is that many think this is very complicated. It can involve a lot of work, is a little bit scary, little bit unknown and a little bit new. In total it may have a tendency for many to end up on the minimum requirements"* (Informant 5). But the level of details in the reports can have several different explanations. One thing is to just publish the total amount of greenhouse gases, but it is more complicated to give a detailed report covering these issues. *"Others can say that; ok, we can do that, but right now the inaccuracies with a high level of reporting are very high. You get a lot of data you cannot use, and it takes a lot of work analyzing the data to get something valuable out from it"* (Informant 6).

It is difficult to say for sure if the other companies are just waiting on the fence for a better reporting standard/method in order to also publish their emissions. Judging by the response from the informants in this research paper, the companies in this industry are well aware of their emissions, most of them have just chosen to not publish it. *"I believe many others do an excellent job in this matter, but the challenge is to present it in a format so people can*

understand it. In my experience, our environmental-work is not dangerous. We have by no means found the ultimate solution, but we have our thing we believe in and deliver by. Then we make adjustments as we move forward" (Informant 5). This is also one problem with this kind of reports, since the majority of people have little understanding about what greenhouse gases. Most of us know they have a negative effect on the environment and cause pollution etc. but we have a difficult time in order to explain this. Like one of the informants said, it is difficult to imagine what these emissions are. We have heard about in the media, but do not know exactly what it is. *"If you ask a man on the street about one ton of CO2 for example, then I believe you would get many different answers, because it is difficult to imagine"* (Informant 5). Most of us have no clue about what can be considered a high amount of emissions from a source. Is one million ton CO2 much? How about ten million, or hundred million. The numbers sounds big, but most of the general public' background have no way of interpreting these numbers. *"We have control over it, but only give our data to those who ask. It is so easy that others misinterpret our data. "Wow, that was a lot" or "That wasn't much", but they have no way of knowing that or interpret if this was a large or small amount* (Informant 4).

One can also think about the old saying "Old habits die hard" when it comes to this. While CSR-reports cannot be said to be a recent thing for companies, many companies may feel comfortable with just doing what they've always done. If it isn't broke, don't fix it. Like the other informants told, they experienced no pressure for other stakeholders then themselves to publish this information, and other companies simply may not feel the urge to publish this for others to see. *"I believe it has to do with tradition and culture. In a way, we do not have a culture of publishing information about everything. Then it becomes a habit and the ways it has always been"* (Informant 4)

Informant 4 is from a company that did not publish information about their greenhouse gas emissions, but stated that they had full control over how much their emissions were. The problem with just publishing the amount of greenhouse gases is that it does not tell the reader much other than the amount. But how can the reader be able to interpret the numbers and say if it is good or bad? The story behind the number is missing, and can cause a lot of confusion for others who are not familiar with these kind of reports, or even industry. *"We do not see that this can have any value. I believe this will just confuse others, because there will be large differences from year to year. These are values we have no control over" (Informant 4)*. And here is one of the problems with certain companies within the shipping industry; they do not

have any control over their ships, since it is the customer that chooses how it operates when they have a contract. *"We have control over our emissions and how much fuel the engines consumes, but it is our customers who operates the vessels. They decide where the ship goes and what operations to perform, so we have no control over the fuel consumption and it is therefore not interesting for us to compare ourselves with other companies."* (Informant 4). This means that for certain segments, greenhouse gas reporting may have little value for them to publish, since the emissions are out of their control. This was also stated by others informants; *"Not all the segments within shipping have a focus on this"* (Informant 6), when asked about why there are big differences among the companies in the shipping industry.

Even if the different segments have different focuses, Informant 4 said that *"You should not underestimate the effect from green operations, since it shows that you have a focus. We have this in a planning-stage to see if we can make a system out from it, without creating a large stack of paper"* (Informant 4). Since the company Informant 4 do not have control over how high their emissions are, or publish that information, these kinds of report may be seen in the future. This is similar to Figge et.al (2015) that suggested that since this sort of reporting is, as of today, a voluntary activity; it can be seen as a symbolic gesture from the company. And even if it is just a symbolic gesture, it seems that there is mostly positive feedback from publishing this information. *"I do not understand why some choose to withhold this type of information. We look at that as degrading the people who are interested in what we are doing and it can also harm discussions. They can have information to share with us, and we have had different actors with us on training and we get a sort of two way communication. We teach them, as well as getting input from them, and in the end it is very good! Because that's what it is about, the environment. We do not lock ourselves in an office and only bring this information when a big contract is about to be signed. We have received a lot a positive feedback on this!"* (Informant 5).

6. Conclusion

The shipping industry in Norway is quite big in a global perspective, judging by the size of the population in Norway. Norway may also have a reputation for trying to push the goals a little further with the examples of trying to be carbon neutral by 2030 and cutting more emissions than what was originally the plan in the Kyoto Protocol. By using that mindset, it is probably reason to expect more from Norwegian companies when it comes to environmental issues, in comparison to other countries that have focused less on these matters the last decades. For someone outside of the industry, it might come as a surprise when it is discovered how few companies that have reports regarding these issues. The first time I was reading the information available from the companies, the expectation was to find much more available information than it is today.

The problem statement for this research paper was ”*How is GHG measured in the Norwegian shipping industry and what are the consequences of publishing it?”* and there is one easy and one more complicated answer to this problem statement. The first part is measurement of greenhouse gases in the Norwegian shipping industry and the answer to that is quite straight forward. Every vessel report in their consumption of resources/fuel daily in the noon-report, and this number is put into an equation that calculates the emissions based on that consumption. These equations have slight differences between each company, where some used a factor of 3,17 for CO2-emissions while others used 3,20 for CO2-emissions. The general measurements of greenhouse gases are straight forward, but the new EU-directive can make this more complicated in the future. The factors used today are insufficient in order to make a fair and valid interpretation of greenhouse gas emissions since different companies and vessels are involved in different activities. One of the examples from this research paper was when a company was scanning a gas-line and plowing for a gas-line. Two very different operations at sea, which also generates two very different amount of greenhouse gas emissions. The fear among the industry now is that this new EU-directive will not be able to provide the necessary tools in order to report their emissions in a way where every different activity is taken into consideration. Companies that are involved in activities creates large emissions are at risk of being forced to report in a way that is unfair for their company.

The second part of the problems statement involves the consequences of publishing greenhouse gas emissions. The companies that were involved in this research paper came from both sides, meaning companies that publish their greenhouse gas emissions and companies that do not publish greenhouse gas emissions. The experience from the companies

that published their greenhouse gas emissions had only positive stories to share when it comes to this subject. They get to show their skills and knowledge in this topic, and as a result other stakeholders are attracted to them. Customers see that they have full control over what they are doing, or can see that their ships are fuel-efficient etc. The perhaps more interesting observation was that the company that did not publish their greenhouse gas emissions did not experience any consequences. The company had full control over their emissions, but had chosen to not publish it. No one where knocking on their door demanding that these numbers were published, or for example environmental organizations that would like to see this numbers listed for the public. Companies could contact them to see these numbers, but otherwise it remained within the company.

Given the media attention today, it is not unreasonable to think that there would be a high focus on reports involving greenhouse gas emissions, but it seems that the media and the real world is not aligned on this topic just quite yet. There are no watchdogs out there that keep an eye on the emissions and raise red flags when these emissions go up or down. The data is simply collected, and then represented in reports later. In conclusion it seems that there are only positive consequences for publishing your greenhouse gas emissions, and that there are no consequences for the companies that do not publish.

Theoretical implications:

During this research I have represented the theoretical background for this research, but there are some weaknesses tied to this matter. As a student of Universitetet i Nordland, access is given to online databases such as for example Emerald. Much of the theory used in this research was gathered from this database, but there were also several articles that were unavailable for me. Articles that seemed relevant, based on the abstract information provided, could only be accessed if you paid up to 40$ in some cases. Because of economic reasons, these articles were not bought and included in this study.

Weaknesses with the study:

One of the weaknesses with this study is the chosen research method was qualitative. This method is suited to use when you seek to achieve a greater understanding of a topic, but it also have its limitations. There were in total 152 members of the Norwegian Shipowners Association that were checked during this research, but only a small sample was interviewed. This means that the findings could have pointed in different directions, depending on which companies that were chosen for interviews. It is therefore not possible to point all the evidence found in this research as something that would apply for all the members.

During the interviews it also became clear that rather than looking at the industry as a whole, it would be better suited to narrow it down to certain segments within this industry. Greenhouse gas reports are not that relevant for those companies that have no control over their emissions, and can therefore provide a very different point of view in comparison to segments that do have control over their own emissions. The value of publishing something you have control over is much more relevant in comparison to those who do not have this control.

This research was also done by one person, which leaves room for error when it comes to analyzing data as well as collecting it. The timespan chosen for this research was from 2011-2014, which in theory would give 152x4= 608 annual reports to search for information. The reports vary in length from as short as 30 pages, to some companies published reports over 100 pages. In addition to the annual reports, the companies' websites were also searched for information. This gives in theory 152 websites to search for information. Some websites are easier than others to find information on, while other companies have almost buried their

information in a maze of links. This means that with this amount of information to search through, it is possible that some available information was not found during the research.

With this in mind, the research can still be viewed as something that go in-depth on the subject, but with a wide view. Rather than investigating certain companies, or all companies, in-depth, this research gives an overview of how the topic of this research is for the members of the Norwegian Shipowners Association.

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Appendix:

Appendix 1: List of companies in different categories

Category 1	Category 2
Eidesvik Offshore ASA	Bukser og Berging AS
Fred. Olsen Energy ASA	BW Gas AS
Grieg Star Group	Chriship AS
Havila Shipping ASA	COSL Drilling Europe AS
Hurtigruten Group ASA	DeepOcean AS
Odfjell SE	DeepWell AS
Prosafe AS	Det Stavangerske Dampskibsselskab
Simon Møkster Shipping AS	Diamond Offshore Netherlands
Solvang ASA	B.V.(Norway
Songa Offshore	DOF Management AS
Technip Norge AS	Dolphin Geophysical AS
Torvald Klaveness	Esvagt Norge AS
Uglands Rederi	First Olsen AS
Wilhelm Wilhelmsen	Høegh Autoliners Group
	Island Offshore Management AS
	Jahre Wallem AS
	Jebsen Management AS
	Kr. G. Jebsen Skipsrederi A/S
	Maersk Drilling Norge AS
	North Sea Shipping AS
	O. H. Meling & Co. AS
	Stena Drilling Ltd
	Storm Offshore AS
	Swire Seabed Shipping AS
	Tananger Offshore AS
	Tschudi Shipping Company AS
	UECC
	Uksnøy & Co. A/S
	V.Ships Norway AS

Category 3	**Category 4**
Bukser og Berging AS	*A/S J. Ludwig Mowinckels Rederi*
BW Gas AS	*A/S Shipmanagement Ltd.*
Chriship AS	*Aage Thoen Ltd AS*
COSL Drilling Europe AS	*Arriva Shipping AS*
DeepOcean AS	*Astrup Fearnley AS*
DeepWell AS	*Awilco*
Det Stavangerske Dampskibsselskab	*Bergshav Management AS*
Diamond Offshore Netherlands	*Blystad Group*
B.V.(Norway	*Brødrene Klovnings Rederi AS*
DOF Management AS	*Brøvigtank AS*
Dolphin Geophysical AS	*Bulkship Management AS*
Esvagt Norge AS	*Champion Tankers*
First Olsen AS	*COG Offshore AS*
Høegh Autoliners Group	*CSL Norway AS*
Island Offshore Management AS	*Eide Marine Services A/S*
Jahre Wallem AS	*Hagland Shipping AS*
Jebsen Management AS	*Hav Ship Management NorRus AS*
Kr. G. Jebsen Skipsrederi A/S	*Havinvest AS*
Maersk Drilling Norge AS	*Høegh LNG Group*
North Sea Shipping AS	*I.M. Skaugen SE*
O. H. Meling & Co. AS	*K Line Offshore AS*
Stena Drilling Ltd	*Klaveness Marine Holding AS*
Storm Offshore AS	*Kopervik Ship Management AS*
Swire Seabed Shipping AS	*Larsen Shipping AS*
Tananger Offshore AS	*Lorentzens Skibs AS*
Tschudi Shipping Company AS	*Misje Rederi*
UECC	*Morten Werrings Rederi AS*
Uksnøy & Co. A/S	*Myklebusthaug Management AS*
V.Ships Norway AS	*O.T. Tønnevold*
	Offshore Logistics AS
	Rolf Wagle A/S

	Sage Forest Carriers Int'l AS *Sanco Holding AS* *Sea Cargo* *Seatrans AS* *Sigba AS* *Teekay Shipping Norway AS* *Thome Ship Management Norway AS* *Thor Dahl Management AS* *Torm Norway A/S* *Utkilen AS* *Vaagebullegruppen/Strømberg* *Vestland Management AS* *Viken Shipping AS* *Westfal-Larsen Shipping*

Category 5	**Category 6**
4Service Offshore AS A/S Borgestad ASA AS Selvaag Invest CGG Services (Norway) AS Color Line Marine AS ESS Mobile Offshore Units AS Fred. Olsen & Co. Maroff Crewing AS Norsk Offshore Catering AS Norwegian Crew Management AS Norwegian Maritime Services A/S Ocean Rig AS Odfjell Drilling AS Petrolia ASA PGS Geophysical AS RC Consultants AS	Atlas Cerno AS Einar Lange Four Partner Shipping Fred. Olsen Production ASA Gard Shipping AS Mosvold Farsund AS North Atlantic Norway Limited Polycrest A/S Th. Jacobsen Management AS Tor Husjord Management AS Westfal Larsen Management AS William Hansen ANS

Remøy Management AS Rowan Norway Inc. Saipem SpA Norway Sodexo Mobile Units AS Trinity Nordic AS Western Bulk AS	

Appendix 2: Interview guide

Interview Guide:

1: Hvordan måler dere utslipp av klimagasser (C02/NOx/SOx)?

2: Hva bruker dere denne informasjonen til?

3: Hvorfor har dere valgt å publisere/ikke publisere denne informasjonen?

4: Hvem vil dere si er de viktigste interessentene i forbindelse med rapportering av klimagasser?

5: Hvilke konsekvenser får dere av å publisere/ikke publisere utslipp av klimagasser?

6: Hva tror dere er årsaken til at det er store forskjeller i rapportering av klimagasser innad i bransjen?

English translation:

1: How do you measure greenhouse gas emissions (CO2/NOx/SOx)?

2: What is this information used for?

3: Why have you chosen to publish/not publish this information?

4: Who would you say are your most important stakeholders regarding greenhouse gas reports?

5: What consequences do you experience from publishing/not publishing greenhouse gas emissions?

6: What do you think is the cause for the differences in reporting of greenhouse gases in your industry?